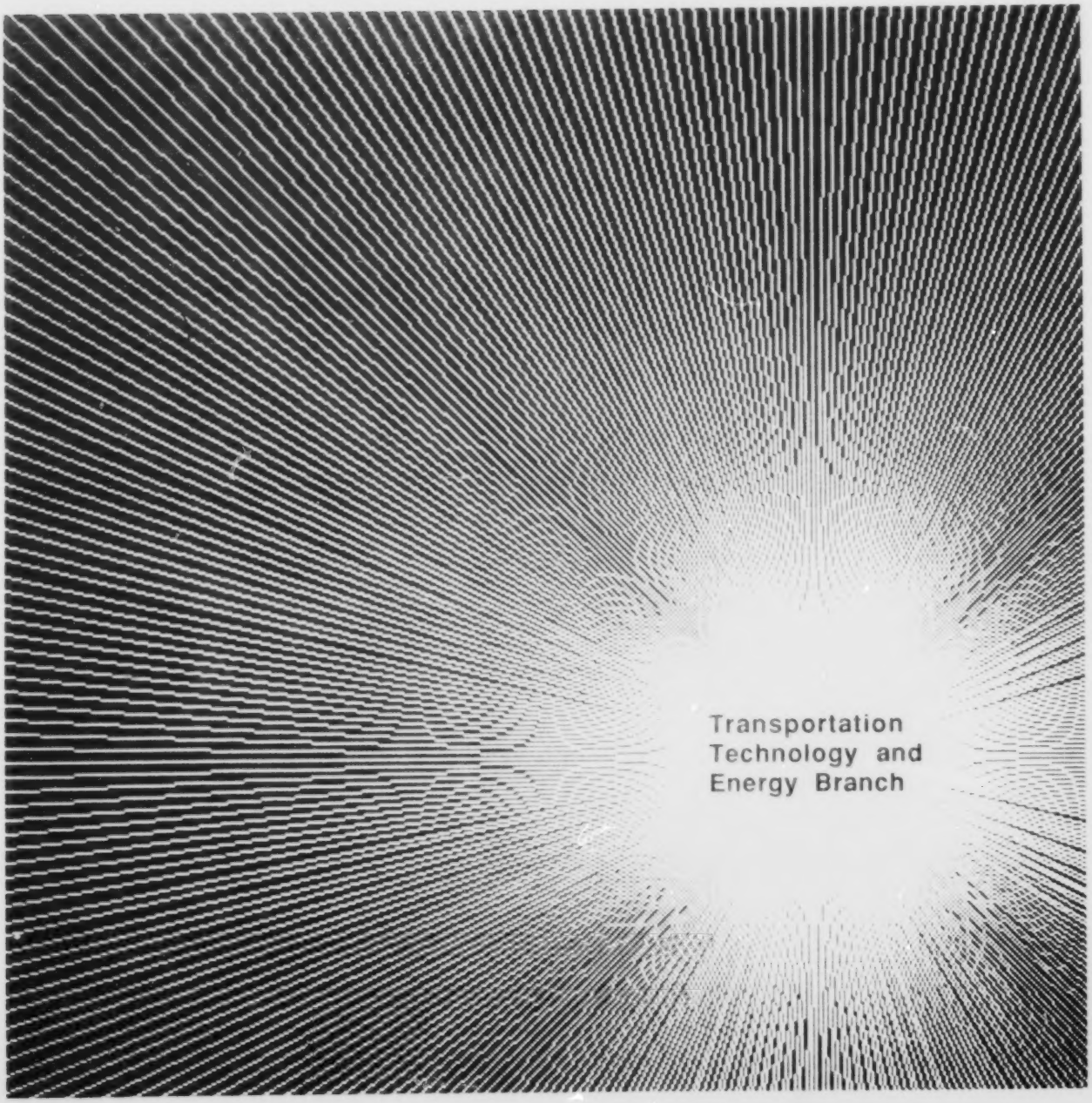
Ontario

Ministry
of
Transportation

Transportation
Technology and
Energy Branch



Public/Private Opportunities in Intelligent Vehicle/Highway Systems (IVHS) – Seminar Presentations

TCT-92-04

Public/Private Opportunities in Intelligent Vehicle/Highway Systems (IVHS)

Presented by

Ministry of Transportation of Ontario
and
Ministry of Industry, Trade and Technology

August 25, 1992

Harbour Ballroom
The Westin Harbour Castle
Toronto, Ontario

Ontario Ministry of Transportation
Transportation Technology and Energy Branch
Ontario Ministry of Industry, Trade and Technology
ITAC ONTARIO

93-01442/

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PROGRAM

9:00 AM **WELCOME**

Opening Remarks.....**M.D. Harmelink,**
Director, Transportation Technology and Energy Branch, MTO

Overview of IVHS.....**G. Heti,**
Manager, Transportation Control Technology and Systems Office, MTO

Opportunities and Related Government Assistance Programs.....**Lyle Bunn**
Consultant, Information Technologies Domestic Industry Support Branch, MITT

10:00 AM Coffee Break

10:15 AM **SPEAKERS**

Canadian Initiatives.....**L. Strasberg,**
Research Engineer, MTO

International IVHS Activities.....**E.R. Case,**
Principal, E.R. Case & Associates

"Access to the U.S. Market".....**K. Bebenek,**
Associate, IBI Group

"Access to the Far East Market".....**K. Stockholm,**
Senior Systems Specialist, Delcan

"International Marketing".....**D. Grovestine,**
Assistant Vice President, Northern Telecom

"The Ideal Public/Private Venture".....**E. Rule,**
Partner, Coopers & Lybrand

12:15 PM Lunch

Current Ministry Activities and Market Needs

1:15 PM **Freeway Traffic Management** .....**P. Masters**

Metro Traffic Information Production System.....**G. Heti**

TravelGuide: hardware (palmtop), datacasting, voice synthesis.....**G. Heti**

International IVHS Standards Development.....**J. Wang**

Commercial Vehicle Operations.....**J. Tsai**

Advanced Public Transportation Systems .....**B. Pekilis**

3:00 PM Coffee Break

3:15 PM **Seminar Summary**.....**M.D. Harmelink**

3:30 PM **Discussion and Follow-up**
Opportunity to meet one-on-one with ministry staff to discuss opportunities and potential cooperative ventures.

IVHS SEMINAR

Attendees

Ian Alexander	Alcatel
Rahamat Ali	Seltech Satellite Systems
Scott Anderson	Talarian Corp.
Jagdeep Bachher	Atlantis Aerospace Corp.
George Bedard	Hickling Corp.
Al Betz	3M Canada
Catherine Black	NCR
Bob Blay	McCormick Rankin
Stewart Bush	Talarian
Cy Caine	Callstream Communications Inc.
Gordon Chillcott	CM Inc.
Frank Cotter	Deloitte & Touche
Randy Cracknell	ESRI Canada Ltd.
Peter Crowder	Uninet Network Inc.
Peter de Groot	Toronto Transit Commission
Don Drewell	Electronic Integrated Systems
David Edwards	Traffic Mgt. & Engineering - MTO
John Elvidge	Alcatel
Don Ferguson	Disys Corp.
Clive Gillon	Alcatel
Lamberto Gomes	Novum Systems
Mendel Greenberg	Electronic Integrated Systems
John Greenough	Mun. of Metro Toronto
Ray Gregg	Integral Consulting
Michèle Guillet	Communications Canada
Bryan Haigh	Read, Voorhees & Associates
David Halayko	Communications Canada
Dan Hopkins	Ultrapage
Brian Hudgin	Sun Microsystems of Canada
Jean Innes	MTO
Bill Johnson	Transport Canada
Steve Keen	UMA Engineering
Ted Kerr	Packet Communications Ltd.
Bert Knight	MTO
Dick Ko	Ministry of Culture and Communications
Dick Kohles	Cue Paging
Rob Kühnen	Callstream Communications Inc.
Tom Laffey	Talarian Corp.
Zoe Lam	MTO
Laurel Larcombe	IBM
Andy Lunardo	Surveys & Designs - MTO
Nancy Mancini	ITAC

Dan Manor	Electronic Integrated Systems Inc.
Linda Matthews	Bull HN Information Ssytems
Vince McEwan	Ledstar Inc.
John Moore	Transp. Costing & Prod. - MTO
Jim Mossman	Alcatel
Kirk Nesbitt	Rogers Broadcasting Ltd.
Jay Neubauer	Bull HN Information Systems
John Nixon	Camco
Bob Norton	Applied Electronics
Doug Parker	IBI Group
Jouko Parviainen	Parviainen & Associates
Frank Politano	Alcatel
Bob Pritchard	Electronic Integrated Systems
Dave Richardson	Marshall Macklin Monaghan
Marc Rigby	TXN Solution Integrators
Lewis Sabounghi	Transport Canada
Barry Schecter	Ultrapage
Joseph Schmidt	Joseph Schmidt & Associates
Tom Seebeck	Callstream Communications Inc.
Russell Smith	Richmond Management Group
Harold Stevens	Digicom Inc.
Dr. Al Stewart	Royal Military College of Canada
Sid Tarek	Prior Data Sciences
Hugh Walker	ORTECH International
Ron Whitelock	Fortran Traffic Systems Limited
Mark Wyndlow	Zeos International Ltd.
George Yanovski	TT&E Branch - MTO
Sandu Zeller	Fortran Traffic Systems Limited
Bruce Zvaniga	Mun. of Metro Toronto

Speakers

Kevin Bebenek	IBI Group
Lyle Bunn	Min. of Industry, Trade & Technology
Rye Case	E.R. Case & Associates
Don Grovestine	Northern Telecom
Milt Harmelink	TT&E Branch - MTO
Gabriel Heti	TT&E Branch - MTO
Phil Masters	Freeway Traffic Management - MTO
Barry Pekilis	TT&E Branch - MTO
Erik Rule	Coopers & Lybrand
Kent Stokholm	Delcan
Louis Strasberg	TT&E Branch - MTO
Joe Tsai	TT&E Branch - MTO
Jackson Wang	TT&E Branch - MTO

PUBLIC/PRIVATE OPPORTUNITIES

IN

INTELLIGENT VEHICLE/HIGHWAY SYSTEMS

CANADIAN INITIATIVES

L. STRASBERG

P.ENG.

MINISTRY OF TRANSPORTATION OF ONTARIO

TRANSPORTATION TECHNOLOGY & ENERGY BRANCH

August 25, 1992

CANADIAN INITIATIVES

BROAD CANADIAN INITIATIVES FOCUS AROUND:

- o TAC (Transportation Association of Canada)
- o IVHS Roundtable
- o Working Group on Communications for IVHS
- o GIS-T (Geographical Information System - for Transportation)
- o Vision 2000
- o CITE (Canadian Institute for Transportation Engineers)

IVHS ROUNDTABLE - MEMBERSHIP

- Formed a Few Years Ago to Keep Abreast of
  (Mainly) US Developments
- Feds & Ontario Prominent
- Now Under Auspices of TAC
- The Following Have "Formally Joined", Attended Meetings
  And/Or Signalled Their Intention To Become Members:
  (AN INCOMPLETE LIST)
- Federal Government
  - Transport Canada
  - Department of Communications
  - National Research Council
- Provincial Ministries of Transportation

IVHS ROUNDTABLE - MEMBERSHIP

- Canadian Trucking Association
- Ontario Trucking Association
- Canadian Automobile Association
- Vision 2000
- CMAC / CTAC (Manufacturing/Electronics)
- (CUTA) Canadian Urban Transit Association
- Regional Municipality of Ottawa/Carleton
- Consultants
- Universities

IVHS ROUNDTABLE - ACTIVITIES

- o Dissemination of Information
- o Sponsoring of Seminars, Workshops
- o Facilitator of Activities
- o Liaison for International Activities
- o Provision of "Brokerage" Services
- o Information Exchange
- o Networking

ACTIVITY CENTRES

- Developing Around
  - Ontario
  - Quebec
  - Saskatchewan
  - Alberta
  - British Columbia
  - Nova Scotia

C - HELP

Canadian Heavy vehicle Electronic Licence Plates

- Using AVI, AVC and WIM Technologies
  - Automatic Vehicle Identification
  - Automatic Vehicle Classification
  - Weigh In Motion
- Joint Program with U.S.
- Canadian Suppliers Involved

SCOOT INITIATIVES

- An Advanced Traffic Management System
- Split Cycling Offset Optimization Technique
- Demonstration/Pilot Projects in

  Red Deer, Alberta

  Halifax, Nova Scotia

  Toronto, Ontario

ONTARIO INITIATIVES

- Several will be Presented Later
- Some Additional Ones
  - INTEGRATION - for TRAVTEK, Troy, others
  - RTMS (Road Traffic Microwave Sensor)
  - Corridor Management - Lakeshore/QEW/427
  - SCOOT
  - Transit - Telerider; Precursor/Smart Card
  - Industry - Vapor/HELP

INITIATIVES IN QUEBEC

- Gestions des Corridors Autoroutiers
  - A Traffic Management System for Autoroutes around Montreal
  - $26 m
  - System Still requires Cameras, more Loops, TOC and Communications
- Systeme de Gestion de la Circulation sur les Ponts de Quebec et Pierre La Porte
  - Reversible Lanes on One of Two Bridges Leading into Quebec

INITIATIVES IN QUEBEC

- Human Factors and System Studies Related to Advanced Transportation Systems
  - Signing (Electronic Signs)
  - Risk and Compensation (Liability Issues)
- Advanced Tools and Methods
  - GIS System Using GPS Receivers in Police Cruisers
  - Electronic Data Base for Truckers (Road Information)
  - Simulation Tool for Driver Training
- Transit
  - University of Montreal - Research
- Industry.
  - Vapor - Tags for HELP ("Now" Mississaugua)
  - GIRO - Software for Transit

INITIATIVES ON THE PRAIRIES AND IN THE WEST

- o Alberta
  - University of Alberta
  - Research; Consulting
- o Saskatchewan
  - IRD - Supplier of WIM's for HELP

    (Including USA)
- o British Columbia
  - HELP Participant
  - Massey Tunnel

VISION 2000

- o " ... to Accelerate the Development and Exploitation of New Technologies for Advanced Personal Communications"
- o DOC "Driven"
- o Had Involvement with:
  - CMAC (Microelectronics)
  - CTAC (Telecommunications)
  - IVHS Roundtable

WORKING GROUP ON COMMUNICATIONS FOR IVHS

- Under Auspices of Roundtable
- DOC/MTO/TC
- Interface with IVHS America
- Next Meeting - MTO, 09 Sep

GIS - T

- Geographical Information System for Transportation
- Canadian Initiatives May Come Under Auspices of Roundtable
- EMR - Pilot Project for Road Transportation Database
- MTO - As Part of MTIPS (Real Time Traffic Information Pilot)
- Metro Ambulance (Toronto) - Advanced Research and some Deployment
- Coordination Beginning/Committee Being Formed

VNIS 93

- Ottawa 1993
- Involvement By:
  - TAC/Roundtable
  - CITE (Canadian Institute of Transportation Engineers)
  - MTO/TC
- Founding Conference: VNIS 89 - MTO/TC
- Other Conferences in Detroit, Michigan; Oslo, Norway

CONCLUSIONS

- Several Activities Already Underway
- Many Are Being Formed
- New Technologies Herald Opportunity
- See List of "Contact Points"

CONTACT POINTS for SOME CANADIAN INITIATIVES IN IVHS

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INTERNATIONAL IVHS ACTIVITIES

Public/Private Opportunities

in

Intelligent Vehicle/Highway Systems (IVHS)

presented by

E. Ryerson Case

E.R. Case & Associates

August 25, 1992

Overview

Will cover:

- **Europe**
- **Japan**
- **United States**

Will focus on:

- **Major actors in IVHS**
- **Major programs**
- **Public/private partnerships**
- **Institutional arrangements**

Reference -

Canadian IVHS Roundtable Synopsis Report (available soon)

Europe

Major Actors in RTI/IVHS
(RTI - Road Transport Informatics)

- European Community (EC)
  - 12 Common Market States
  - Administered by Commission of European Communities (CEC)
  - DRIVE is their most important IVHS/RTI program (Dedicated Road Infrastructure for Vehicle Safety in Europe)

- Eureka
  - Europe's response to the US SDI Program
  - 3 RTI projects accepted:
    * PROMETHEUS - (Program for European Traffic with Highest Efficiency and Unprecedented Safety) - most important
    * CARMINAT - driver information and navigation system
    * DEMETER - digital map exchange standard

Europe

Major Actors in RTI/IVHS (cont'd)

- European Conference of Ministers of Transport (ECMT)
  - Represents all European countries
  - Mainly concerned with setting RTI standards for Europe - digital maps, communications (e.g. RDS-TMC), etc.

- ERTICO (European Road Transport Telematic Implementation and Coordinating Organization)
  - Public/private organization promoting RTI in Europe
  - Similar role as IVHS America in the US
  - Recently formed, with EC encouragement

Europe

DRIVE I

- 3 year pre-competitive research program (ended in '91)
- $150 M, 60 projects - highly successful
- Consortia from government, industry and research institutions
- Cost shared 50/50 government/industry
- Open tender requiring participation of at least two independent partners from different countries, one from industry
- Non-EC participation allowed but with no EC funding

Europe

DRIVE II

- Advanced Transport Telematics (ATT) Program
- 3 years, $250 M, starting Jan. '92
- Emphasis on pilot projects based on DRIVE I results
- Field trials in 20 cities and 2 major corridors (Paris-London, Lyon-Stuttgart)
- Functional areas being evaluated:
  - automatic debiting
  - demand management
  - smart cards applications
  - traffic information
  - electronic data interchange
  - urban traffic control
  - route guidance
  - traffic control and route guidance

Europe

PROMETHEUS

- 7 year, $800 M program
- Private sector initiative
- Started by 18 European auto companies in 1986 - now more
- Safety a key element (goal - 50% casualty reduction by year 2000)
- 11 member steering committee - industry membership only
- "Council" - membership from government and research institutes
- Pro-competitive R&D only - free competition thereafter
- Combines applied research (by industry) and basic research (by 40 universities and research institutions)
- Common European Demonstrators (CEDs)

Europe

PROMETHEUS Common European Demonstrators

To evaluate developments in 10 key areas:

1. Vision enhancement
2. Proper vehicle operation
3. Collision avoidance
4. Co-operative driving
5. Autonomous intelligent cruise control
6. Emergency systems
7. Commercial fleet management
8. Test sites for traffic management
9. Dual mode route guidance
10. Travel information systems

J.W./92-44-020IVHS

Japan

Major Actors in IVHS

Japanese Government:

- Ministry of International Trade and Industry (MITI)
  - Industrial Science and Technology Agency
- Ministry of Construction (MC)
  - Japan Highway Public Corporation - interurban expressways
  - Metropolitan Expressway Public Corporation - urban expressways
- National Police Agency (NPA)
  - Responsible for all TCS's in Japan except for expressways
  - ATCS - 160 systems, standardized throughout Japan
- Ministry of Posts and Telecommunications (MPT)
  - Regulatory responsibility - frequency allocation, etc.

Japan

Major Actors in IVHS (cont'd)

Public/Private Associations:

- Japan Traffic Management Technology Association (TMT)
  - Under National Police Agency
  - MPT collaboration
  - 60 companies
  - Responsible for CACS, RACS, SSVS and PVS

- Association of Electronic Technology for Automobile Technology and Driving (JSK)
  - Under MITI
  - NPA and MC collaboration
  - 57 companies
  - Responsible for ATCS and AMTICS

- Digital Road Map Association (DRMA)
  - Under MC
  - Many companies
  - Standard map database for IVHS applications in Japan

- Highway Industry Development Organization (HIDO)
  - Created by MC
  - Over 300 companies
  - Involved in CACS and RACS

Japan

Major IVHS Projects:

- **Advanced Mobile Traffic Information & Communications System (AMTICS)**
- **Road Automobile Communications System (RACS)**
- **Super Smart Vehicle Systems (SSVS)**
  - **Coordinated by MITI**
  - **20 - 30 year horizon**
  - **3 major universities**
  - **20 major automobile (incl. Volvo & M-Benz) and electronics companies**
- **Person Vehicle System (PVS)**
- **Next Generation Highway Traffic System (NeGHTS)**

Japan

Current Developments:

- **Vehicle Information and Communications System (VICS) Program**
  - **Under MC, NPA and MPT**
  - **To resolve the RACS versus AMTICS problem**
  - **Reach consensus on a driver information and routing system for implementation throughout Japan in this decade**
  - **400,000 in-vehicle navigation systems have been sold in Japan**

- **Liaison Council for IVHS/RTI Japan**
  - **Members JTMTA, HIDO and JSK**
  - **To play liaison role in IVHS/RTI in Japan**

Japan

Some Observations:

- **MITI has played a vital long-range role in nurturing development**
- **Projects provide opportunity for many players from industry and research institutions**
- **Willingness to proceed with plausible projects to learn by doing**
- **Public/private collaboration served their respective goals**
- **Commercial success of in-vehicle navigators encouraging implementation**

United States

Major Actors in IVHS

Government:

- US Department of Transportation
  - Federal Highway Administration (FHWA)
  - Federal Transit Administration (FTA)
  - National Highway Traffic Safety Administration (NHTSA)
- State DOTs
  - CA, MI, MN, TX, IL, FL, WA, AZ, NY, etc.
- Counties
  - Oakland, MI; etc.
- Cities
  - Los Angeles

United States

Major Actors in IVHS (cont'd)

Associations:

- **Intelligent Vehicle-Highway Society of America (IVHS America)**
- **Highway Users Federation**
- **American Automobile Association (AAA)**
- **American Trucking Association (ATA)**
- **American Association of State and Highway Transportation Officials (AASHTO)**

United States

Major Actors in IVHS (cont'd)

State Programs:

- **PATH Program - California**
  - **Program on Advanced Technology for the Highway**
  - **Caltrans and UC Berkeley**
  - **70 projects, budget about $17 M**
  - **Full range of IVHS technologies, emphasis on clean air and full highway automation**
- **UMTRI Program - Michigan**
  - **Univ. of Michigan Transportation Research Institute**
  - **Partnership U of M, MI DOT, FHWA, Industry**
  - **Focus on ATMS and ATIS**
  - **Comprehensive IVHS graduate program**

United States

Major Actors in IVHS (cont'd)

State Programs:

- **GUIDESTAR - Minnesota**
  - Cooperative program
  - U. of Minnesota, MN DOT, FHWA, Industry
  - Focus on ATMS, ATIS, and Fleet Management
  - Pioneered video detector

- **ENTERPRISE**
  - Cooperative program
  - AZ, CO, IO, MI, MN, WA, ON, FHWA, TC
  - Private sector - consultants, auto and electronics industries
  - To facilitate development and implementation
  - Share experience and avoid duplication

United States

Operational Tests

- 9 involving ATMS
- 6 involving ATIS
- 2 involving Commercial Vehicle Operations

United States

IVHS America

- Non-profit organization est. Jan. '91
- Membership from industry, all levels of gov't, associations, agencies, universities, individuals, *from all countries*
- Goals:
  - Be focus for IVHS community in North America
  - Recommend standards, specs and protocols for N.A.
  - Foster research
  - Promoted international cooperation
  - Advise US DOT on IVHS

United States

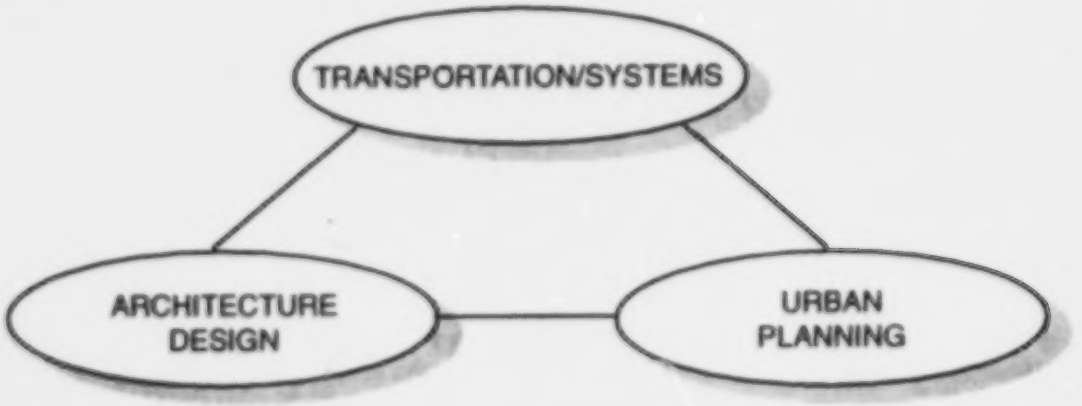
IVHS America (cont'd)

- Strategic Plan
  - Formally presented to US DOT
  - Guide for implementation of IVHS in the US
- Canadian Representation
  - MTO, MTQ, and TAC are member organizations
  - Sit on Board of Directors
  - Individual memberships

The Intermodal Surface Transportation Efficiency Act of 1991

- ISTEA-91 - Determines distribution of Federal-Aid Funds
- Funding - $155 B over 6 year period
  - Highway Trust Fund - past/future highway user fees
  - General Fund - from taxes
  - Generally provides 80% matching funds
- Intelligent Vehicle Highway Systems Act
  - $660 M over 6 years
  - $500 M for IVHS corridors
  - $158 M for IVHS R&D

IBI GROUP



- 18 YEARS OF PROFESSIONAL PRACTICE
- OVER 250 PEOPLE ACROSS NORTH AMERICA

IVHS ACTIVITIES - ONTARIO

- EXPERIENCE DATING TO EARLY 1980'S
- ATMS DEVELOPMENT AND IMPLEMENTATION
  - QEW BURLINGTON SKYWAY
  - QEW MISSISSAUGA
  - HIGHWAY 401 COMPASS
- GARDINER-LAKE SHORE CTMS

U.S. OPPORTUNITIES IN IVHS

1991 INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT (ISTEA)

- **$155 BILLION PROGRAM OVER 6 YEARS**
- **$660 MILLION FOR IVHS RESEARCH AND DEMONSTRATION**
- **RELATED PROGRAMS e.g. OTHER TRANSIT AND MOTOR CARRIER INITIATIVES**

IVHS AMERICA

U.S. IVHS MARKET

THE CLIENTS...

- FHWA
  - R&D; STANDARDS
  - 80% OF FUNDING FOR STATE INITIATIVES
- MULTI-STATE PROJECTS
  - e.g. HELP, CRESCENT
  - OPERATIONS ORIENTED
- STATES
  - FREEWAY, AREA-WIDE OPERATIONS
- LOCAL
  - AREA-WIDE IVHS PLANNING/DEMOS
- PRIVATE
  - ELECTRONIC TOLL
  - FLEET OPERATORS

US IVHS MARKET

SERVICES REQUIRED...

POTENTIAL ROLE AS:

- **CONCEIVER**
- **DESIGNER**
- **IMPLEMENTOR**

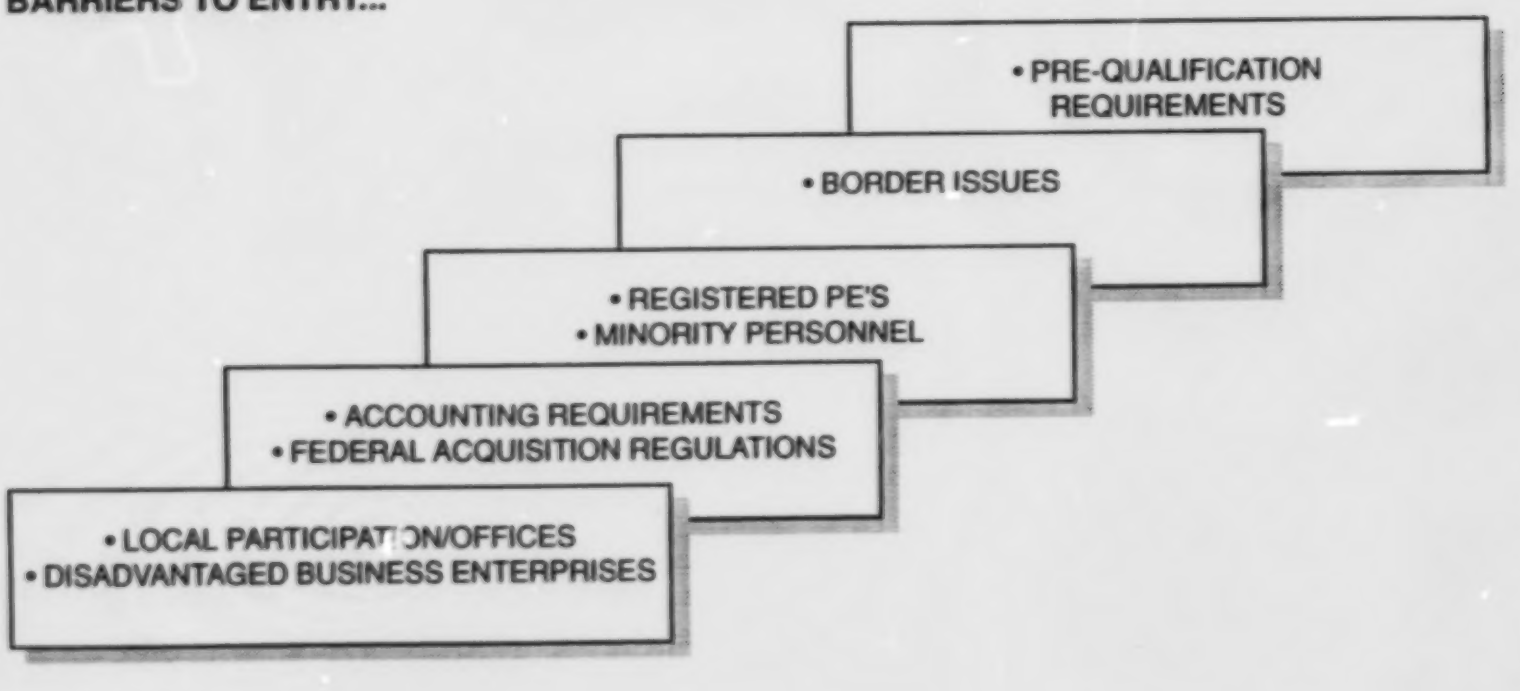
U.S. IVHS MARKET

OTHERS IN MARKET...

- LARGE TRANSPORTATION ENGINEERING FIRMS
- SPECIALIZED IVHS CONSULTANTS
- INDIVIDUAL EXPERTS
- DEFENCE CONTRACTORS

US IVHS MARKET

BARRIERS TO ENTRY...



IBI GROUP APPROACH

FINDING THE WORK...

- TRADE JOURNALS
- BULLETINS
- CONFERENCES
- CLIENT RELATIONSHIPS
- TEAM RELATIONSHIPS

TYPICALLY RFP ENVIRONMENT

IBI GROUP APPROACH

PURSUING WORK...

- RESPONSE TO RFP USUALLY REQUIRES ALLIANCE:
  - LARGE U.S. FIRMS NEEDING IVHS NICHE
  - U.S. IVHS FIRMS NEED NICHE e.g. SOFTWARE
  - LOCAL DBE REQUIREMENT
- AS EXPERIENCE BUILDS, INCREASING ROLE AS PRIME

IBI GROUP APPROACH

UPON AWARD...

- **COMMITMENT OF STAFF MEMBERS**
- **SEEK REGISTRATION**
- **ALLOCATION OF SENIOR MANAGEMENT**
- **IMPLEMENTATION OF PROJECT OFFICE AS REQUIRED**

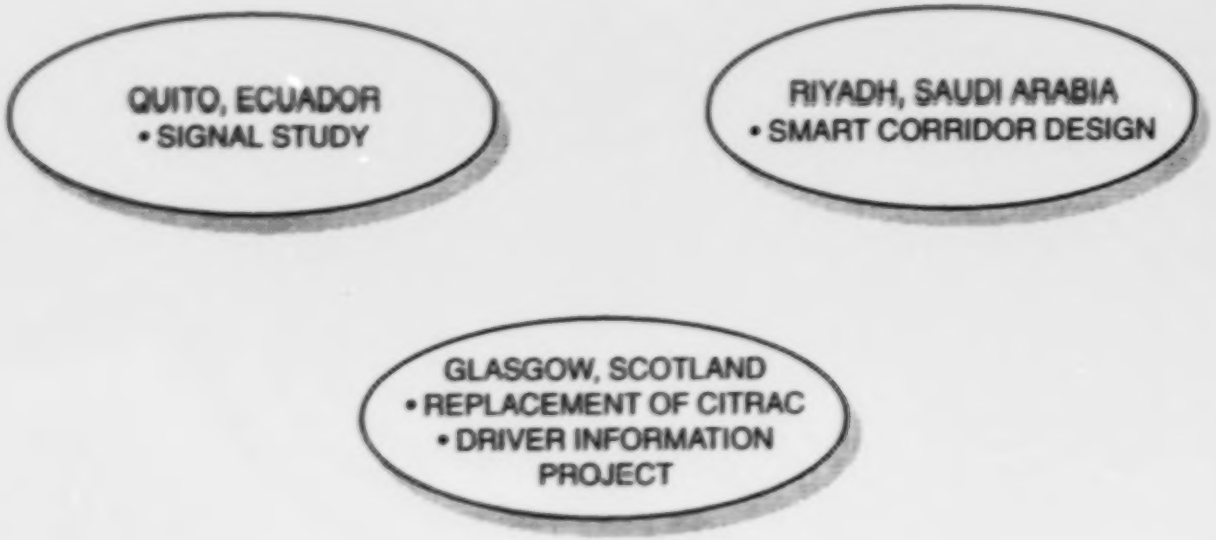
IBI GROUP EXPERIENCE
US IVHS PROJECTS

	ATMS	ATIS	CVO	APTS
BOSTON CA/T	●			
IRVINE TRAFFIC MANAGEMENT AND OPERATIONS STUDY	●	●	●	●
CALTRANS TALKING LOOP PROJECT		●	●	●
CALTRANS CCTV AND COMMUNICATIONS	●			
ORLANDO 1 - 4 SOFTWARE	●	●		
ILLINOIS ADVANCE IVHS DEMONSTRATION	●	●		
PORTLAND	●			
COLORADO	●			

IBI GROUP EXPERIENCE
US IVHS PROJECTS

EXPANDED HORIZONS

IBI GROUP INTERNATIONAL PROJECT EXPERIENCE



FUTURE DIRECTIONS

PROLIFERATION OF "OFF-THE-SHELF" INTEGRATED SYSTEMS,

MARKETED BY CONSORTIUMS PROVIDING FULL TURNKEY SERVICE

CANADIAN EXPERTISE

- **ENGINEERING SERVICES**
- **ACADEMIA**
- **MANUFACTURERS**
- **PUBLIC SECTOR**

INTERNATIONAL MARKETING

WHEN IN ROME,

DO AS THE

ROMANS DO!

08/25/92-DG2

SIX STEPS TO MARKET PENETRATION

- ASSESS THE MARKET OPPORTUNITY
- ASSESS THE MARKET CONSTRAINTS
- DETERMINE THE OVERALL APPROACH
- SELECT PARTNER(S)
- AGREE ON SCOPE OF ARRANGEMENT
- IMPLEMENT

ASSESSING THE MARKET OPPORTUNITY

- **MARKET SIZE**
  - NEAR TERM
  - LONG TERM
- **CREDIBILITY**
  - LIKELIHOOD SIGNIFICANT SALES CAN BE MADE
- **COMPETITION**
  - WHAT ARE THE COMPETITORS' RELATIVE STRENGTHS AND WEAKNESSES (INCLUDING AVAILABILITY OF FINANCING)
- **DESIRABILITY**
  - PROFITABILITY
  - R&D REQUIREMENTS
  - EASE/COST OF SUPPORT
  - INVESTMENT

ASSESSING THE MARKET CONSTRAINTS

- LACK OF FX
- PROCUREMENT PRACTICES
- TARIFF BARRIERS
- SOPHISTICATION OF END USERS
- POLITICAL STABILITY
- REQUIREMENT FOR LOCAL CONTENT
- NEED FOR LOCAL PRESENCE OF MANUFACTURER/TECHNOLOGY OWNER

SIX STEPS TO MARKET PENETRATION

- ASSESS THE MARKET OPPORTUNITY
- ASSESS THE MARKET CONSTRAINTS
- DETERMINE THE OVERALL APPROACH
- SELECT PARTNER(S)
- AGREE ON SCOPE OF ARRANGEMENT
- IMPLEMENT

CHANNELS TO MARKET

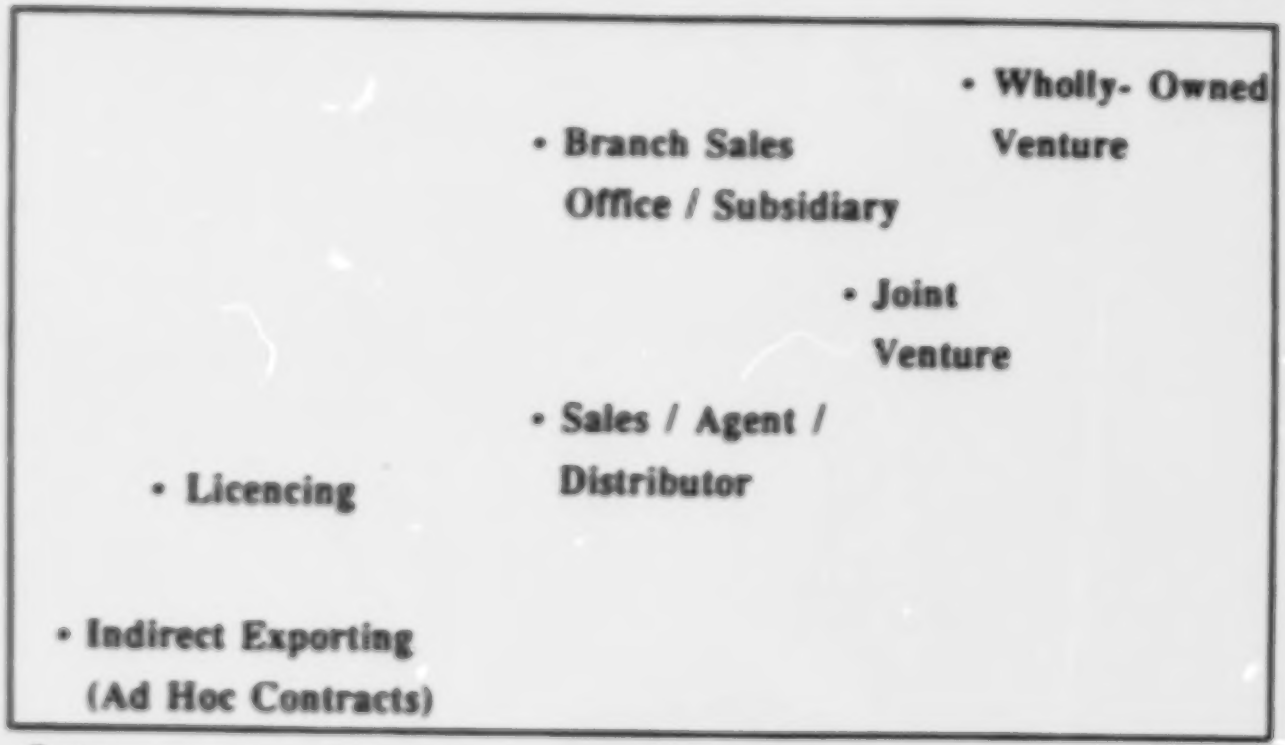
- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

DIRECT SALES MAYBE DIFFICULT/IMPRACTICAL/

IMPOSSIBLE, BECAUSE OF:

- **LOCAL LAWS AND CUSTOMS**
- **LOCAL PURCHASING POLICY/NATIONAL INTEREST**
- **SIZE OF BUSINESS POTENTIAL (SMALL)**
- **"POLITICAL"/PERSONAL SAFETY CONSIDERATIONS**

Typical Tradeoffs Between Risk and Control / Reward Among Market Entry Options



SELECT PARTNERS

- COMPLEMENTARY BUSINESS STRATEGIES
- COMPLEMENTARY MARKETING STRENGTHS AND WEAKNESSES
- NON-CONFLICTING ORGANIZATIONAL AND OPERATING PHILOSOPHIES
- CHEMISTRY

SIX STEPS TO MARKET PENETRATION

- ASSESS THE MARKET OPPORTUNITY
- ASSESS THE MARKET CONSTRAINTS
- DETERMINE THE OVERALL APPROACH
- SELECT PARTNER(S)
- AGREE ON SCOPE OF ARRANGEMENT
- IMPLEMENT

CHANNELS TO MARKET

- **DIRECT SALE**
- **REPRESENTATIVES**
- **DISTRIBUTORS**
- **JOINT VENTURES**
- **MANUFACTURING LICENSEES**
- **GLOBAL ACCOUNTS**

DIRECT SALES

- LOCAL OFFICE REQUIREMENTS
- LOCAL CONTENT REQUIREMENTS
- SUPPORT ORGANIZATION

CHANNELS TO MARKET

- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

REPRESENTATIVE

USED WHERE FOREIGN MANUFACTURED GOODS CAN BE SOLD, BUT WHERE CUSTOMERS PREFER TO DEAL DIRECTLY WITH MANUFACTURER.

REPRESENTATIVE

A REPRESENTATIVE FACILITATES SALES *BY NT*, BY:

- SOLICITING ORDERS, AND REPORTING ON POTENTIAL SALES OPPORTUNITIES
- OBTAINING TENDER DOCUMENTS/RFQ AND SPECIFICATIONS
- ADVISING AND SUPPORTING NEGOTIATIONS
- ADVISING ON LOCAL CUSTOMS

BUT HAS NO RIGHT TO MAKE COMMITMENTS ON BEHALF OF NT

REPRESENTATIVE

A REPRESENTATIVE IS PAID A COMMISSION

- **BASED ON F.O.B. FACTORY VALUE OF NT-SUPPLIED GOODS,**
- **AT A RATE COMMENSURATE WITH SERVICES TO BE PROVIDED, AND**
- **AFTER PAYMENT FOR GOODS IS RECEIVED BY NT.**

CHANNELS TO MARKET

- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

DISTRIBUTOR

A DISTRIBUTOR IS AN INDEPENDENT BUSINESS ENTITY WHO BUYS FROM NT AND RESELLS IN AN AGREED TERRITORY.

A DISTRIBUTOR COMMITS TO:

- **PURCHASE MINIMUM QUANTITIES**
- **MAKE QUARTERLY ROLLING FORECASTS**
- **OBTAIN REGULATORY APPROVALS**
- **SUPPORT PRODUCT**

OTHER AGREEMENTS

- RIGHT TO KNOW/ETAS
- INSTALLATION
- REPAIR

DISTRIBUTOR

A DISTRIBUTOR IS APPOINTED WHERE FOREIGN-MANUFACTURED GOODS CAN BE SOLD, AND CUSTOMERS ARE CONTENT TO DEAL WITH A LOCAL COMPANY.

CHANNELS TO MARKET

- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

JOINT VENTURE

A COMPANY FORMED WITH ONE OR MORE (LOCAL) PARTNERS FOR THE PURPOSE OF CARRYING ON BUSINESS.

THE JV (USUALLY) IS AN "ARM'S LENGTH" ARRANGEMENT WITH WHICH NT DEALS AS ANY OTHER INDEPENDENT COMPANY.

JOINT VENTURE

A JOINT VENTURE IS OFTEN AN ATTRACTIVE VEHICLE TO REDUCE THE INVESTMENT REQUIRED TO CARRY ON BUSINESS IN A COUNTRY.

THE JV IS USALLY LICENSED TO MANUFACTURE AND SELL PRODUCTS BASED ON NT'S TECHNOLOGY.

JOINT VENTURE CONTRIBUTIONS

NT	LOCAL PARTNER
TECHNOLOGY	BUILDINGS AND MACHINERY
CAPITAL EQUIPMENTS	STAFF
OPERATING CAPITAL (FX)	OPERATING CAPITAL (LOCAL CURRENCY)
MANUFACTURING EXPERTISE	MARKETING AND OTHER EXPERTISE.

CHANNELS TO MARKET

- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

MANUFACTURING LICENSEE

A MANUFACTURING LICENSEE IS A LOCAL MANUFACTURER OR JV WHO MANUFACTURES ONE OR MORE PRODUCTS USING/BASED ON TECHNICAL INFORMATION SUPPLIED BY NT, AND

- SELLS THOSE PRODUCTS IN A DEFINED TERRITORY

MANUFACTURING LICENSEES' RIGHTS

- RIGHT TO RECEIVE AND MODIFY TECHNICAL INFORMATION
- RIGHT TO MANUFACTURE PRODUCT BASED ON TECHNICAL INFORMATION
- EXCLUSIVE RIGHT TO SELL IN HOME COUNTRY
- NON-EXCLUSIVE RIGHT TO SELL IN TERRITORY

MANUFACTURING LICENSEES

PAYMENTS

- LUMP SUM - CASH AND/OR EQUITY (JV)
- ROYALTIES (INCLUDING MINIMUM AMOUNTS)
- GATHERING CHARGES
- TECHNICAL ASSISTANCE

MANUFACTURING LICENSEE

THE PRODUCT MANUFACTURED AND SOLD BY A MANUFACTURING LICENSEE IS A PRODUCT OF THE LICENSEE, NOT A PRODUCT OF NT. (EVEN THOUGH NT MAY HAVE SUPPLIED A LARGE PART OF IT).

PRODUCT INSTALLATION, WARRANTY, SUPPORT, REPAIR AND LIABILITY IS THE RESPONSIBILITY OF THE LICENSEE.

CHANNELS TO MARKET

- DIRECT SALE
- REPRESENTATIVES
- DISTRIBUTORS
- JOINT VENTURES
- MANUFACTURING LICENSEES
- GLOBAL ACCOUNTS

MULTINATIONAL/GLOBAL

ACCOUNTS STRATEGY

"ONE-STOP SHOPPING"

- **CUSTOMER PLACES ORDERS ON NT FOR GLOBAL REQUIREMENTS**
- **NT COORDINATES SUPPLY FROM CHANNELS**
- **CUSTOMER GETS VOLUME DISCOUNT BASED ON GLOBAL BUSINESS**

INTELLECTUAL PROPERTY RIGHTS (IPR) IDIOSYNCRACIES

- LICENSEE CANNOT BE RESTRICTED IN THE USE IT MAKES OF TRANSFERRED TECHNOLOGY (BRAZIL)
- CANNOT UNILATERALLY TERMINATE REPRESENTATIVE OR DISTRIBUTOR WITHOUT LIABILITY [LATIN/SOUTH AMERICA & SOME EUROPEAN COUNTRIES (BELGIUM)]
- LICENSEE/DISTRIBUTOR GETS WORLDWIDE RIGHT EXCEPT WHERE LICENSOR HAS EXCLUSIVE ARRANGEMENTS (KOREA)
- LICENSEE/DISTRIBUTOR CANNOT BE RESTRICTED TO A PARTICULAR COUNTRY (E.E.C./CARTAGENA)
- GOV'T IMPOSES MAXIMUM ROYALTY % AMOUNT AND MAXIMUM DURATION OF ROYALTY/CONFIDENTIALITY (VENEZUELA/ZIMBABWE)
- INADEQUATE INTELLECTUAL PROPERTY RIGHT PROTECTION.

MTO, MITT, ITAC, IVHS Business Opportunities Seminar

Guidelines for Successful Public/Private Collaborative Ventures

August 25, 1992

Erik Rule
Partner
Coopers & Lybrand

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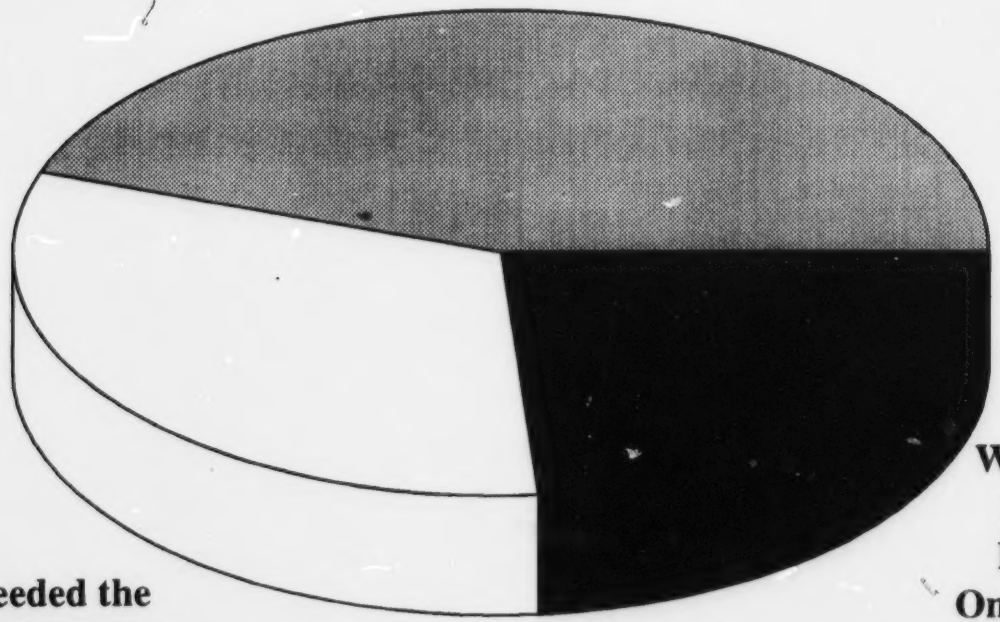
Few JV's are successful in the private sector


Achieved Limited Success but Fell Short of the Partner's Expectations 45%
Was Prematurely Disbanded, or Bought Out by One of the Partners 16%
Too New to Evaluate 8%
Met or Exceeded the Expectations of the Partners 32%

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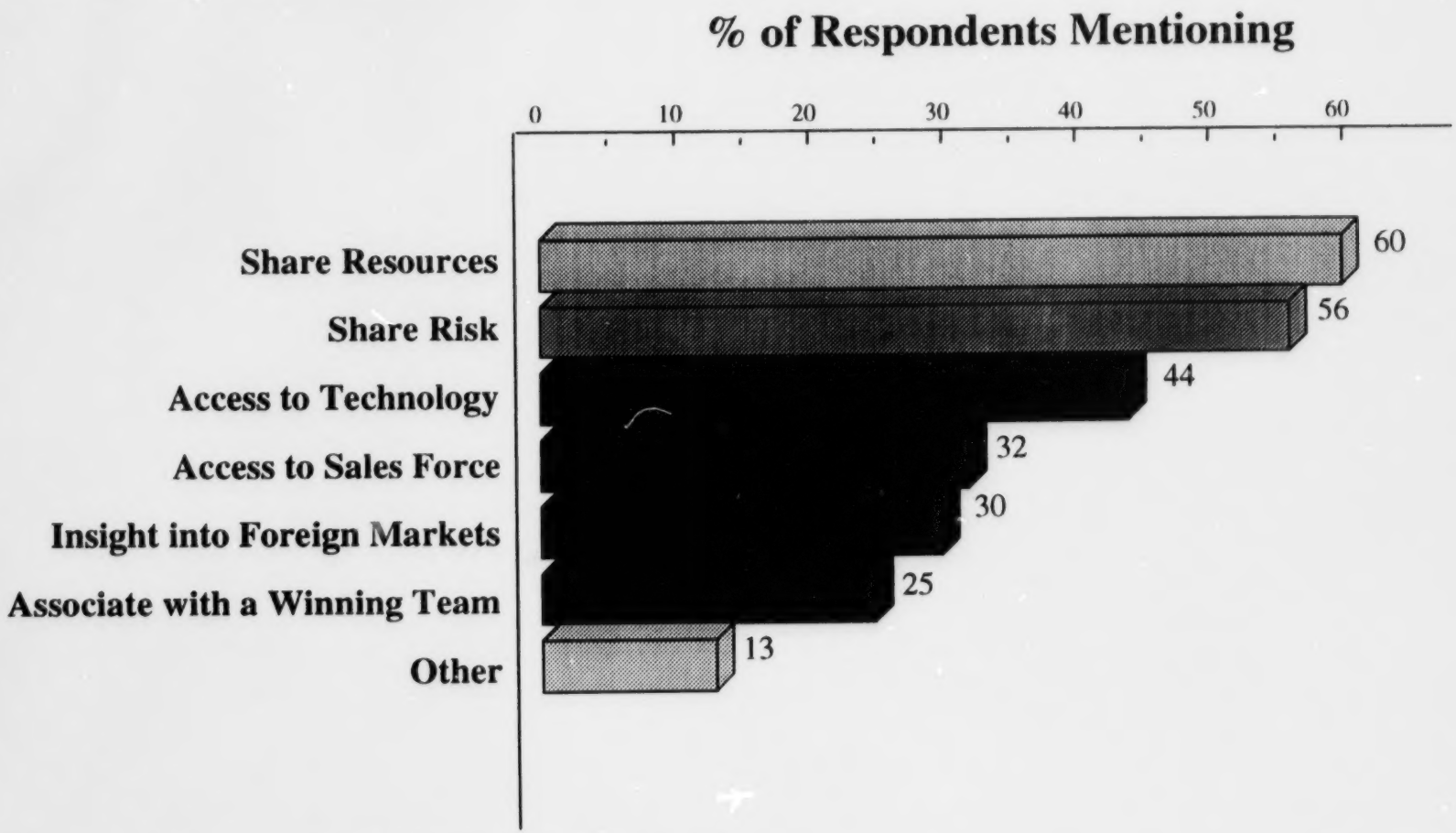
Reasons vary for forming joint ventures in the private sector



Source: C&L survey of 143 Canadian companies

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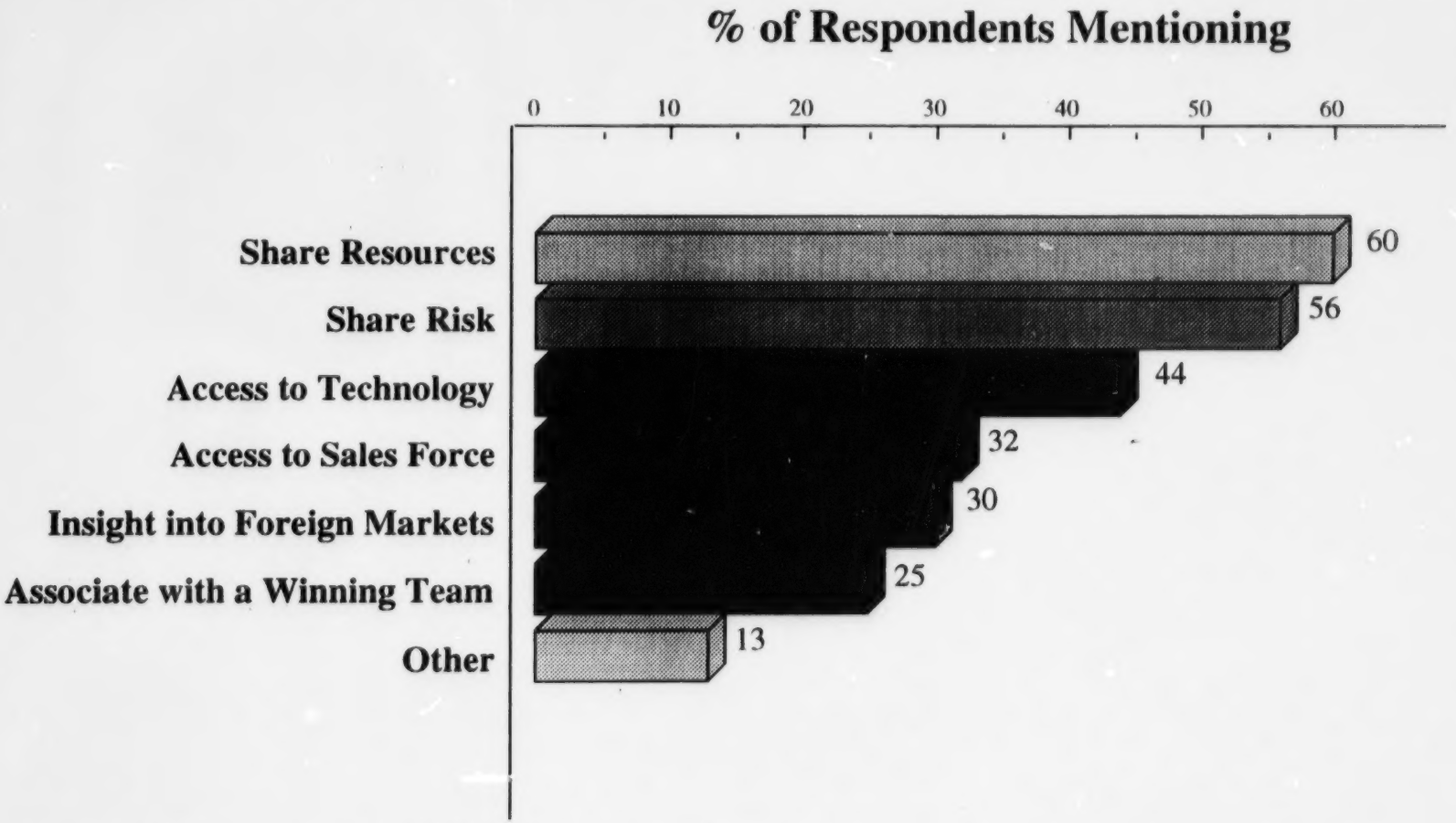
Reasons vary for forming joint ventures



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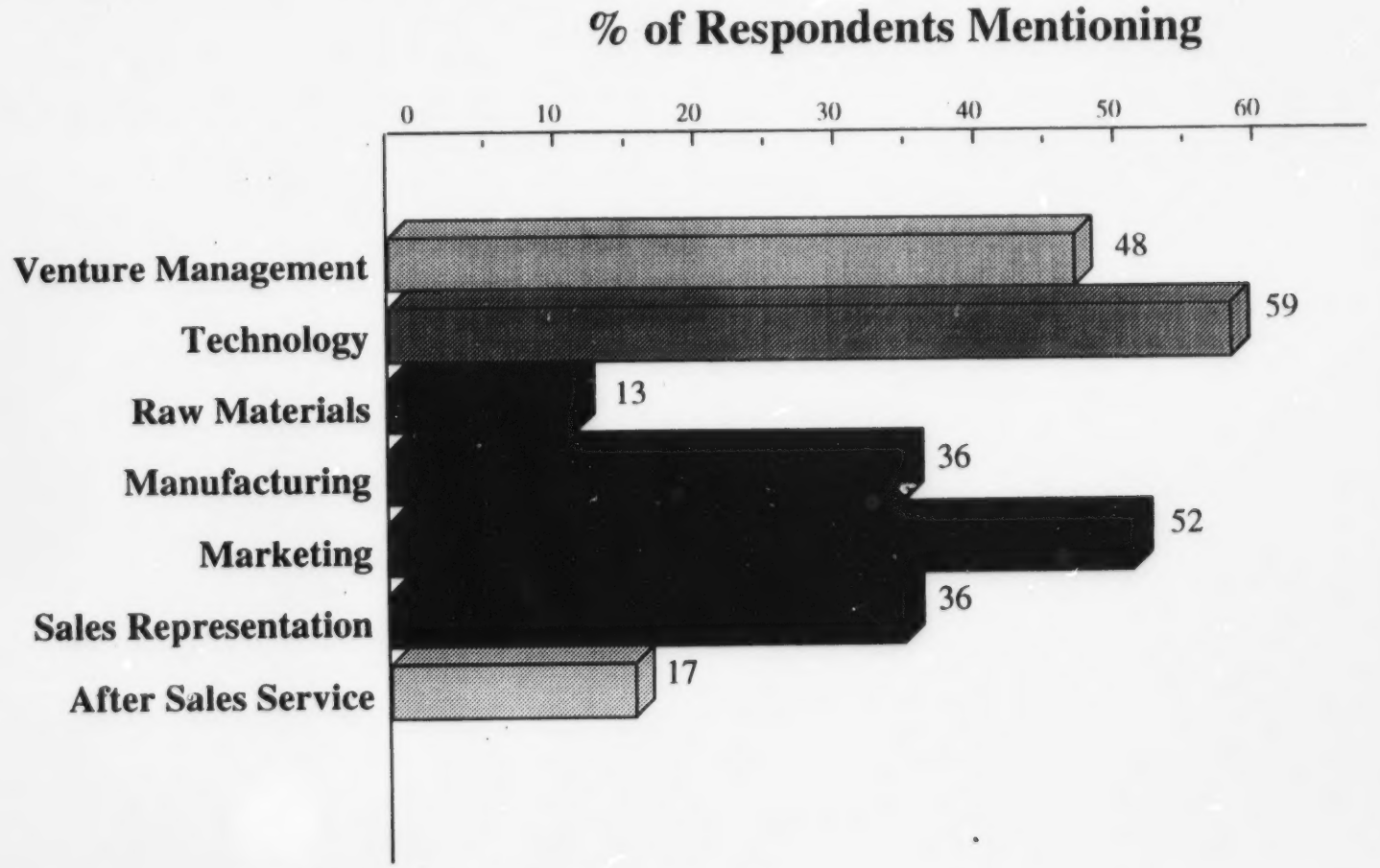
Contributions to collaborative ventures



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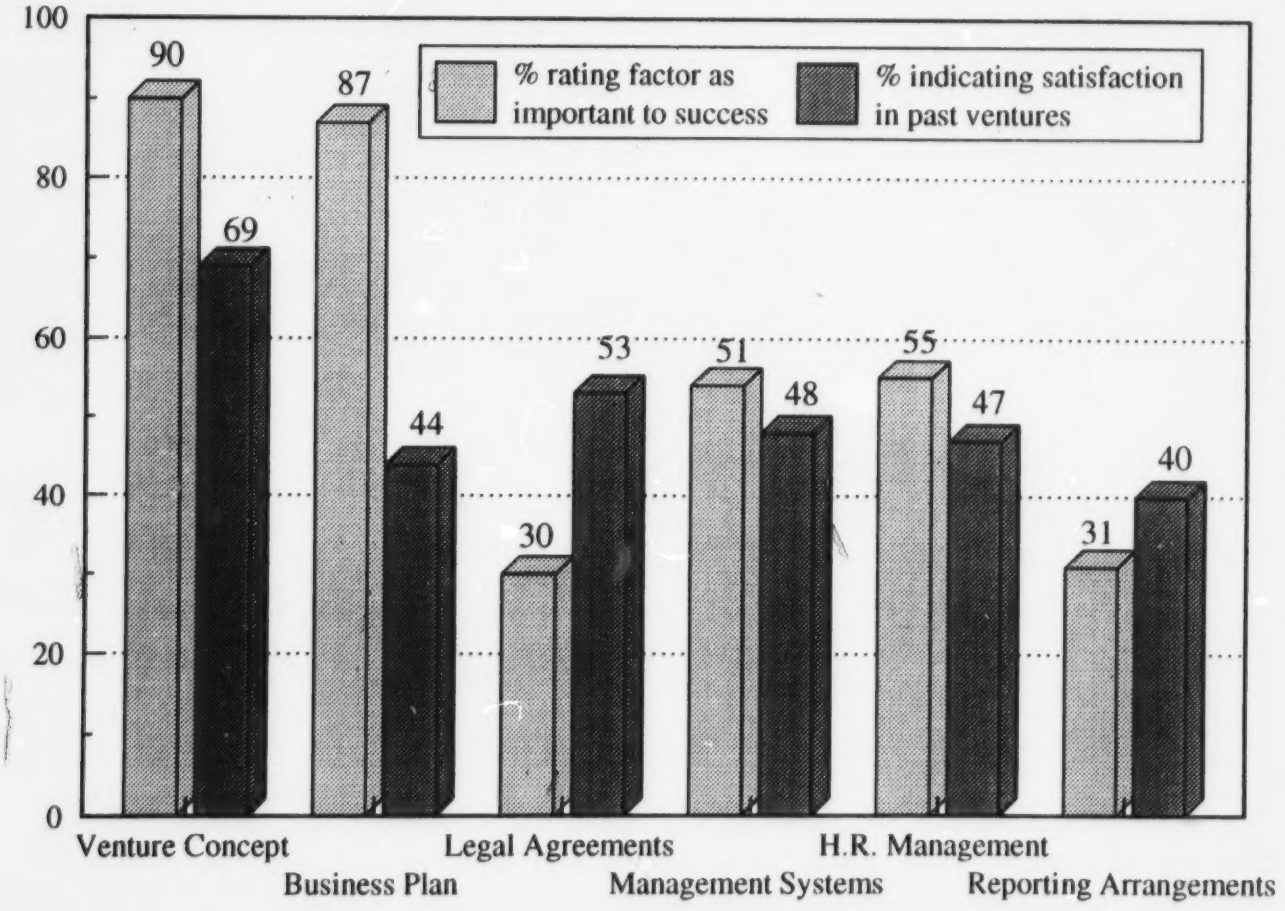
Success factors in collaborative ventures



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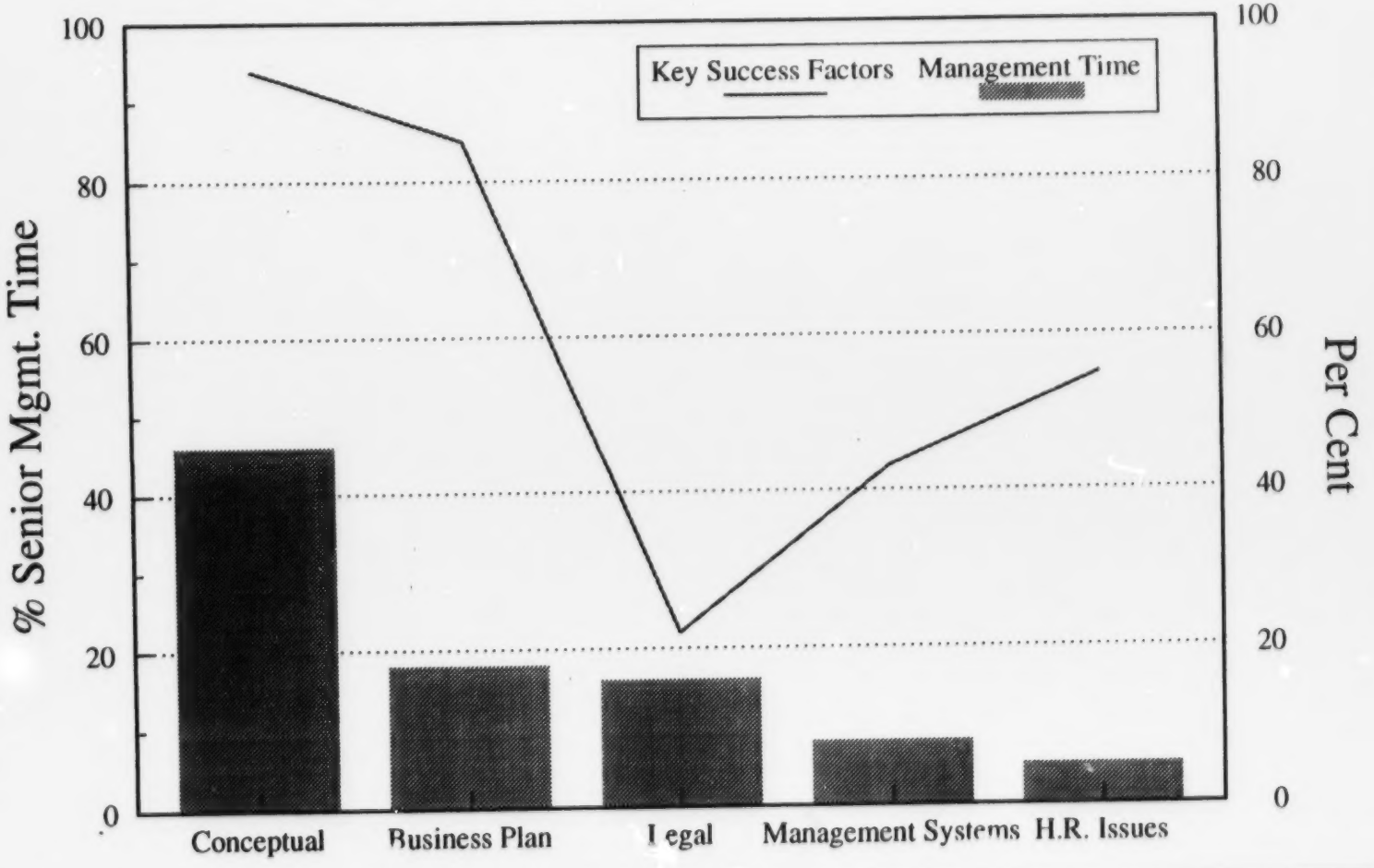
Planning and people are key



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What does the ideal public-private collaborative venture look like?

Factor	*Example*
Expectations are clear over a multi-year period	A business plan is in place
Continuity is maintained in liaision staff	Relationships are more important than titles
Progress is monitored and reported periodically	Semi-annual briefings held
Partners should stay out of day-to-day management	Public sector partner typically acts as a customer and/or banker
Alliance is mutually beneficial	Spar Aerospace, Integration

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THE DEVELOPMENT OF FREEWAY TRAFFIC MANAGEMENT SYSTEMS IN THE PROVINCE OF ONTARIO

1. INTRODUCTION

Freeway Traffic Management Systems (FTMS) were originally developed in the United States in the early 1960's. Within the Ontario context, Freeway Traffic Management can be defined as a system for managing the traffic flow on freeways in order to obtain the maximum use of the freeway system under varying roadway and traffic conditions.

The basic objective of a freeway traffic management system is to minimize the detrimental effects associated with both recurring and non-recurring congestion. These effects include travel delays, accidents, air pollution and energy consumption.

Recurring congestion is caused by a traffic demand volume in excess of the roadway's capacity. This type of congestion is relatively predictable and usually occurs during the peak periods at approximately the same location and same time.

Non-recurring congestion is caused by "randomly" occurring incidents (i.e. accidents, breakdowns, etc.) which lead to a reduction in roadway capacity. The reduction in capacity is further compounded by the "rubber-necking" factor: there is a tendency among motorists to slow down to view the incident. For example, for a three lane freeway cross-section, an incident which is entirely on the shoulder will still reduce throughput by 15%. An incident that blocks one lane will reduce throughput by 44%. Approximately 60% of the congestion delay on the Greater Toronto Area freeway network is due to recurring congestion.

Freeway Traffic Management Systems are typically considered for busy urban freeways which already have significant congestion problems or have a clear potential for severe congestion in the future. Despite growing traffic demands on the Province's urban freeways it is often not financially possible or socially acceptable to implement major capacity improvements. Instead, the Ministry of Transportation must "manage" each facility in order to maximize its utility.

A properly designed and implemented freeway traffic management system can yield significant quantifiable benefits in the form of reductions in delay, accidents and fuel consumption. Some of the less tangible benefits include a reduction in vehicle emissions, improved traffic data collection, reduction in driver frustration and the encouragement of technological development.

2. FREEWAY TRAFFIC MANAGEMENT SYSTEMS IN ONTARIO

i) QEW Mississauga FTMS

The QEW Mississauga FTMS was begun in 1975 as a project to demonstrate the principles of freeway traffic management. The original system covered the eastbound lanes of the QEW between Southdown Road and Highway 10 and concentrated on dealing with the congestion bottleneck that occurred at Highway 10 during the morning peak period. The system included detector loops, closed circuit television cameras, ramp metering and a two-line changeable sign near Southdown Road. The system produced a 21% reduction in vehicle hours of travel, a 45% increase in average speeds and a 22% reduction in collision experience in the demonstration area during the peak periods.

Since that time, the Mississauga system has been expanded to cover the eastbound QEW between Royal Windsor Drive and Hwy 427 and also a portion of the westbound QEW. The system includes full detector and CCTV coverage, 10 metered ramps and 3 changeable message signs. The system is operated 16 hours/day from a renovated bungalow near the Highway 10 interchange.

ii) Burlington Skyway FTMS

The QEW Burlington Bay/James N. Allan Skyway FTMS was originally justified as a traffic management tool during the extensive reconstruction and rehabilitation activities that took place in the area throughout the 1980's. The system came into operation in 1985. The system allows traffic to be monitored on both skyways and on a parallel arterial road which crosses over a lift bridge. The parallel arterial road is equipped with signal pre-emptions and special blank-out signs which can be activated to accommodate additional traffic that may need to be diverted from one of the skyways. Outlying blank-out signs are also used to communicate with drivers. The system is operated from the MTO Burlington District Office and has direct communications links with the Ontario Provincial Police (O.P.P.) the media and the lift bridge operator.

Despite an 8% increase in traffic volumes in this corridor during 1986, an almost 30% reduction in accidents occurred, which is largely attributable to the Burlington FTMS.

iii) Highway 401 FTMS-COMPASS

The Highway 401 through the Greater Toronto Area is one of North America's busiest freeways, with some sections carrying in excess of 325,000 vehicles per day. The Highway 401 FTMS is by far the most complex traffic management system ever implemented in Ontario. The initial system is 16 km in length, from Yonge St. to Martin Grove Road with full detector and CCTV coverage. The system focuses on Incident Management and Motorist Advisory strategies.

3. FTMS STRATEGIES

Most FTMS (freeway traffic management systems) employ four basic strategies.

i) Incident Detection and Confirmation

Before any type of management strategy can be employed it is essential that there is reliable, accurate and timely information on roadway and traffic conditions. The primary means of detection in an FTMS is through the use of wire loop detectors embedded in each driving lane of the pavement at approximately 500 m intervals. These loops are continuously detecting vehicle movements and the information is compiled at a roadside microprocessor. The information is summarized and relayed at frequent intervals to a central computer via a communications system. The central computer at the traffic operations centre analyzes the data and checks for irregularities in traffic flow. Any potential problem locations are indicated to the operator.

There are presently 66 vehicle detector stations operating on Hwy 401 between Martin Grove Road and Yonge Street. These stations contain a total of 660 loop detectors. Vehicle detector stations cost approximately $45,000.00 per station for the purchasing and installation of all of the field components.

The operator confirms the location and severity of problem with the aid of the closed circuit television (CCTV) subsystem. Closed circuit television cameras are mounted on 15 m concrete poles and located adjacent to the freeways at 1 km intervals. These cameras can be remotely controlled from the control centre to zoom, focus, pan and tilt. Once the operator has verified the problem, an appropriate response must be implemented.

Thirty two CCTV installations are presently in operation between Renforth Road and Warden Avenue on Hwy 401. Each station costs about $40,000.00.

ii) Incident Management

Incidents account for a significant portion of the congestion in the Greater Toronto Area and at present the greatest potential for reductions in delay will result from improved incident management techniques. For each minute of incident duration (the time from occurrence until clearance) between four to ten minutes of resulting delay are produced (e.g. for an incident lasting fifteen minutes, a minimum of one hour of congestion will result). The average incident duration for the Greater Toronto Area is in excess of thirty minutes. In addition, incidents on busy freeways have a great potential to cause what may be called "secondary" accidents. These "secondary" accidents are typically sideswipes or rear-end collisions with the congestion queue or incident site.

As a result, the emphasis is on the operator responding in a timely and comprehensive fashion to an incident in order to reduce both the exposure and duration of the incident. For commonly occurring incidents, response plans are often prestored in the central computer. A typical response plan includes notification of the police/emergency services, notification of towing/clearance services, and implementation of advisory and possibly flow management strategies (see following sections). Most incidents require ongoing monitoring of the situation and adjustments to the traffic management strategies.

Successful Incident Management requires not only the timely transmission of accurate information but also a well-developed working relationship with the various agencies involved. Careful planning and co-ordination is necessary in order to minimize the duration of the incident and maximize safety for the responding personnel and the motorists.

Recent developments in the techniques for incident management include; more aggressive policies on vehicle clearance; the provision of contract towing services; the provision of appropriate incident management equipment (e.g. portable changeable signs); the development of off-highway accident investigation sites and regular inter-agency planning/ evaluation meetings.

iii) Motorist Advisory

A key ingredient for successful traffic management is the ability to advise motorists both prior to and during their trips. The traffic operations centre gathers then disseminates information to the media and other agencies/users. This information includes not only scheduled construction and maintenance activities but also "real-time" information relating to incidents. Media services have the opportunity to receive faxes directly from the FTMS operations centre and receive virtually real-time updates.

Once the motorist is on the roadway, the most dependable means of conveying information is through the use of changeable message signs. The type of sign can range from a simple "blankout" sign to a large dot matrix sign which can display graphics and three lines of text. The signs are usually strategically located so as to inform motorists prior to making a routing decision, or to provide cautionary information prior to entering an area of congestion or accidents.

Motorist Advisory strategies can help to influence route choice, which in turn can help to reduce traffic demand on an already congested freeway. By preparing drivers as they approach an area with adverse traffic conditions, "secondary" type accidents can be reduced. In order for Motorist Advisory strategies to remain effective, it is important that any information released be timely and accurate. Once an Operating Agency's credibility is lost, it takes a long time to restore it.

Presently there are 13 Changeable Message Signs on Hwy 401 between Martin Grove Road and Yonge Street. These signs, manufactured in Ontario, are the largest, most complicated CMS installed in North America to date. These signs employ clusters of green and red L.E.D.'s to form the display matrix and have a graphics capability. The signs and associated field controller, cabinets and trusses cost $400,000.00 per installation.

Several other technologies are now emerging which can only enhance the Motorist Advisory strategies. Pre-trip information can be disseminated by automated telephone answering systems, computer bulletin boards and Cable T.V. feeds. In-car information can be provided by cellular phone information services and Highway Advisory Radio (HAR).

iv) Flow Management and Control

By regulating the amount of traffic entering the freeway it is possible to optimize the freeway traffic flow and as a result operate the facility at maximum efficiency. Ramp Metering is the most common means of attempting to optimize freeway flow. Ramp metering also reduces the amount of turbulence created by vehicles entering the freeway and as a result reduces accident rates.

A properly designed ramp metering installation is extremely cost-effective and results in net travel time savings for the majority of the freeway users, including those who must wait in the queues on the ramps. Implementation of a ramp metering system must be approached very carefully, with extensive consultation with local politicians and the public. At present, ramp metering is only being used on the eastbound QEW through Oakville and Mississauga.

4. COMMUNICATIONS SYSTEM

All of the field equipment in an FTMS must be connected back to the central computer. In the Hwy 401 System this is done by using a state-of-the-art fibre optic communications system. This system is a full fibre system using fibre optics for both trunk communications and low speed connections between trunk nodes and the field equipment. Hwy 401 is the first system in North America to use this type of fibre optics network. The communication network on Hwy 401 cost approximately $200,000.00 per kilometer.

5. OPPORTUNITIES FOR CANADIAN COMPANIES

i) Development

Development is required in a number of areas related to FTMS. Vehicle detection equipment is the primary area. The existing loop technology has been in use for many years. This technology has definite limitations and is difficult to tune or repair. New technology to detect vehicles, especially methods that do not require embedding in the road are needed.

Other possible areas of development include incident detection algorithms, used to determine when traffic conditions indicate possible incident conditions, closed circuit TV technology, changeable message sign technology and communication systems. Some development work is presently proceeding in all of these areas.

ii) There are a number of areas associated with FTMS where companies can get involved with the MTO on a partnership basis as follows:

a) Information Collection and Dissemination

Information dissemination to the public is an important component of FTMS. MTO presently distributes information to the media by computer generated fax from a database of incidents the operations centre is aware of. Partnerships could be formed to develop other dissemination methods including Highway Advisory Radio, text to speech from our incident database, and distribution by paging systems, etc.. Improvements to the information gathering process could also be considered through exchanges of information with media and others who have additional incident data.

b) Incident Management

Although many of the activities undertaken to manage incidents are undertaken by public agencies there is room for partnerships in the areas of provision of courtesy service to the public, provision of towing service, removal and storage of abandoned vehicles and efforts with insurance companies in the whole area of accident investigation, vehicle removal, selection of auto body shops and pounds for accident vehicle storage.

Philip H. Masters, P.Eng.
Supervising Engineer
Systems Operation & Analysis Unit
Freeway Traffic Management Section

September 25, 1992

IVHS OVERVIEW

Public/Private Opportunities
in
Intelligent Vehicle/Highway Systems

Gabriel Heti

Transportation Control Technology and Systems Office

Ontario Ministry of Transportation

Transportation Technology and Energy Branch

August 25, 1992
Toronto

WHAT IS IVHS

Applications of advanced technologies to:

- **increase mobility**
- **improve transportation productivity and efficiency**
- **reduce pollution**
- **enhance safety**

by treating as a system:

- **vehicle**
- **roadway and**
- **control centres**

EXAMPLES OF IVHS

- Freeway and Traffic Management Systems
- Driver Route Guidance Systems
- Vehicle Location and Management Systems
- Commercial Vehicle System Automation
- Automatic Toll Collection Systems
- Collision Avoidance Systems

BENEFICIARIES OF IVHS

- Public
- Transportation Industry
- Transportation Agencies
- High Technology Industries

IVHS CATEGORIES

ATMS - Advanced Traffic Management Systems

ATIS - Advanced Traveller Information Systems

APTS - Advanced Public Transportation Systems

CVO - Commercial Vehicle Operation Systems

AVCS - Advanced Vehicle Control Systems

WHAT'S HAPPENING

- Worldwide recognition of IVHS importance
- THE Major Transportation Program in the US
- IVHS America established 1991
- Six year, $600 Million commitment to RD&D
- Europe active with government/industry programs
- Japan concentrating on in-vehicle systems
- Canada active in IVHS America
- Transport Canada active player
- Ontario has a strong program

WHAT'S ANTICIPATED

- $200 BILLION over 20 years for IVHS in North America
  - 80% purchased by private sector
- 40% of automobile value in electronics in 10 years
- Competition with Europe, Japan
- North American standards/systems
- Electronic license plates/smart cards
- Automated highways

WHO IS DOING WHAT

- Government/Industry Setting IVHS Agenda
- US Congress providing $600 M funding
- Major industries pursuing commercialization
  - Motorola
  - General Motors
  - Telesat Canada
- New industries & new products emerging
- Demonstration projects under way in US, Canada
- Canada setting up IVHS Roundtable
- Canadian companies supplying leading products

MAJOR NORTH AMERICAN PROJECTS

- Route Guidance/Traveller Information Systems
  - Smart Corridor - Los Angeles
  - TravTek - Orlando
  - Advance - Chicago
  - TravelGuide - Ontario
- Commercial Vehicle Automation
  - HELP/Crescent - West Coast
  - Advantage I-75/401
  - I-80 and I-95

KEY TECHNOLOGIES

- Communications
  - Short range
  - 1 and 2-way with vehicles
- Electronics
  - Vehicle Identification
  - Vehicle Location
  - Collision Avoidance
  - Control Systems
- Computers
- Mapping and GIS
- System Integration & Software Development

WHAT ONTARIO IS DOING

- Active in Canadian IVHS Roundtable
- Active in IVHS America
- Partner in early US Demonstrations:
  - ENTERPRISE
  - I-75
  - Border Crossing Automation

WHAT ONTARIO IS DOING (cont)

- Many Ontario projects under way:
  - Traveller Information Systems
  - Wide Area Vehicle Monitoring
  - Transit automation
  - Automated Truck Clearance
  - Freeway Traffic Management

WHAT SHOULD CANADA DO

- Establish own agenda - IVHS Roundtable
- Get funding to pursue Canadian program
- Participate actively in IVHS America to:
  - Set standards and direction
  - Participate in US projects
  - Form alliances
  - Advertise Canadian capabilities
  - Stay current
- Identify and pursue industrial opportunities
- Demonstrate successes and benefits
- Pursue international opportunities

TRAVELGUIDE

Ontario's Low-Cost Route Guidance
and
Traveller Information System Concept

Public/Private Opportunities

in

Intelligent Vehicle/Highway Systems

Gabriel Heti

Transportation Control Technology and Systems Office

Ontario

Ministry of Transportation

Transportation Technology and Energy Branch

August 25, 1992
Toronto

Heti/92-44-027/LowCost

ATIS - ADVANCED TRAVELLER INFORMATION SYSTEMS

Systems to collect and disseminate real time information regarding the transportation network that allow road and transit users to:

- Learn about traffic conditions
- Find their way in new surroundings
- Find the best route to their destinations
- Get information on transit schedules
- Receive services over 1-way and 2- way communication networks

ATIS EXAMPLES

- Pager type traffic data receivers
- Portable route guidance devices
- In-vehicle location and guidance systems
- Terminal map displays showing traffic congestion
- Terminal based route advisories
- Changeable message sign advisories

POTENTIAL ATIS BENEFITS

- Advance knowledge of trip duration
- Trip routing and guidance
- Congestion avoidance
- Shorter trip times
- Reduced cost of travel
- Reduced pollution
- Enhanced safety
- Location of services
- User comfort

ATIS ELEMENTS

- Traffic and transit data collection
- Data processing
- Data dissemination
- Data reception
- User interface devices
- Road network map data bases
- Route selection and guidance capabilities
- Vehicle location system
- Ancillary services

ATIS CAN PROVIDE INFORMATION ABOUT

- Traffic conditions
- Traffic incidents
- Road conditions
- Weather
- Transit schedules
- Additional "yellow pages" type information:
  - hotels, restaurants, theatres
  - hospitals, police
  - tourist attractions

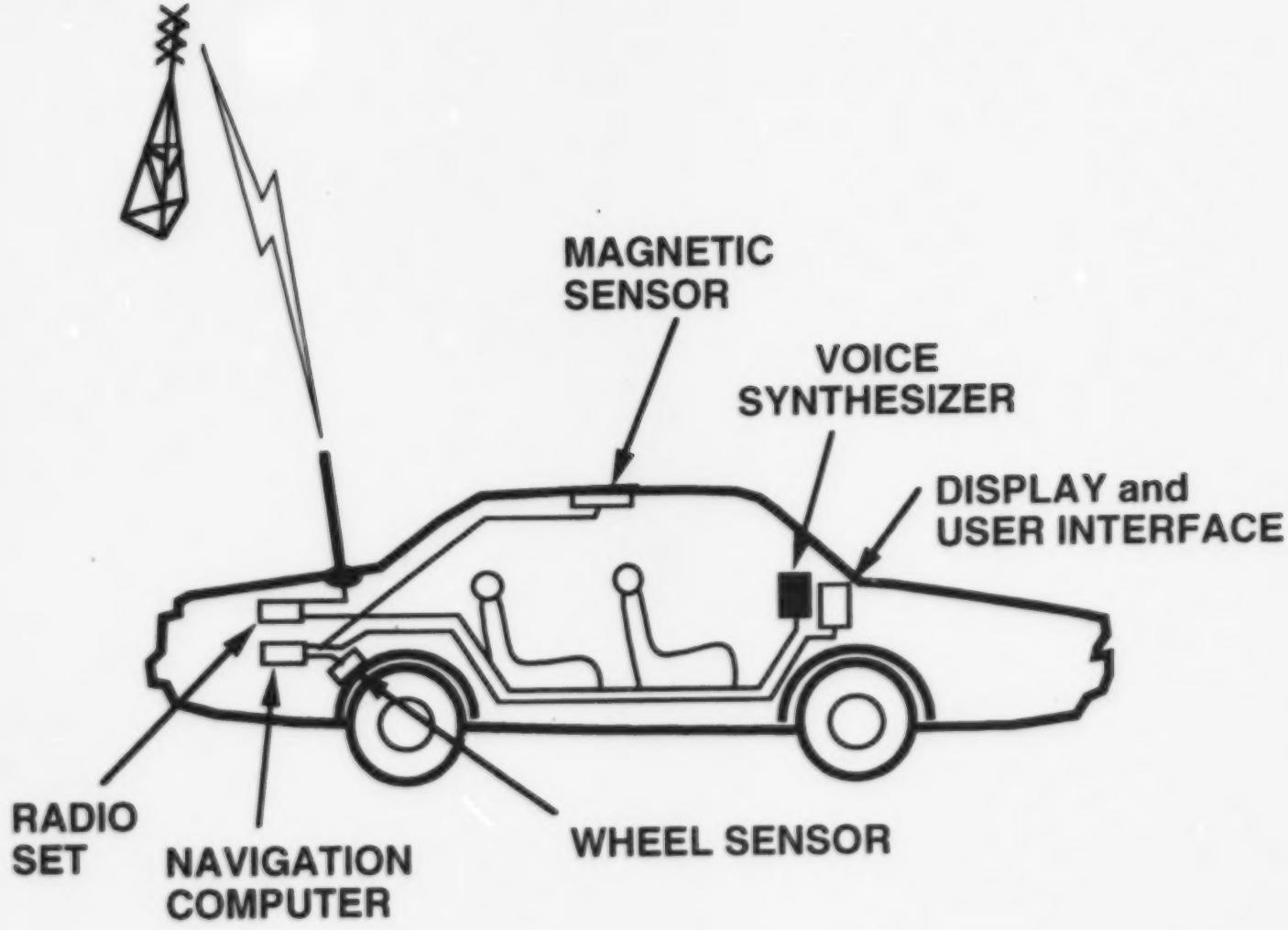
ATIS ACTIVITIES

- Japan early developer of in-vehicle high end systems
- European demonstration of infrastructure based systems
- US demonstrations of in-vehicle systems:
  - Smart Corridor - Los Angeles
  - Travtek - Orlando
  - Advance - Chicago
- IVHS America working on architectures and standards
- Industry marketing low end/cost systems
- Industry developing supporting technologies
- Ontario developing advanced, low cost system

TYPICAL HIGH END IN-VEHICLE SYSTEM

- In-dash system
- 2 way data communications
- Vehicle location capability
- Route guidance capability
- Colour CRT
- CD-ROM based map data base
- Computer/processor
- Cost: $3000 - $5000

HIGH-END IN-VEHICLE ROUTE GUIDANCE SYSTEM



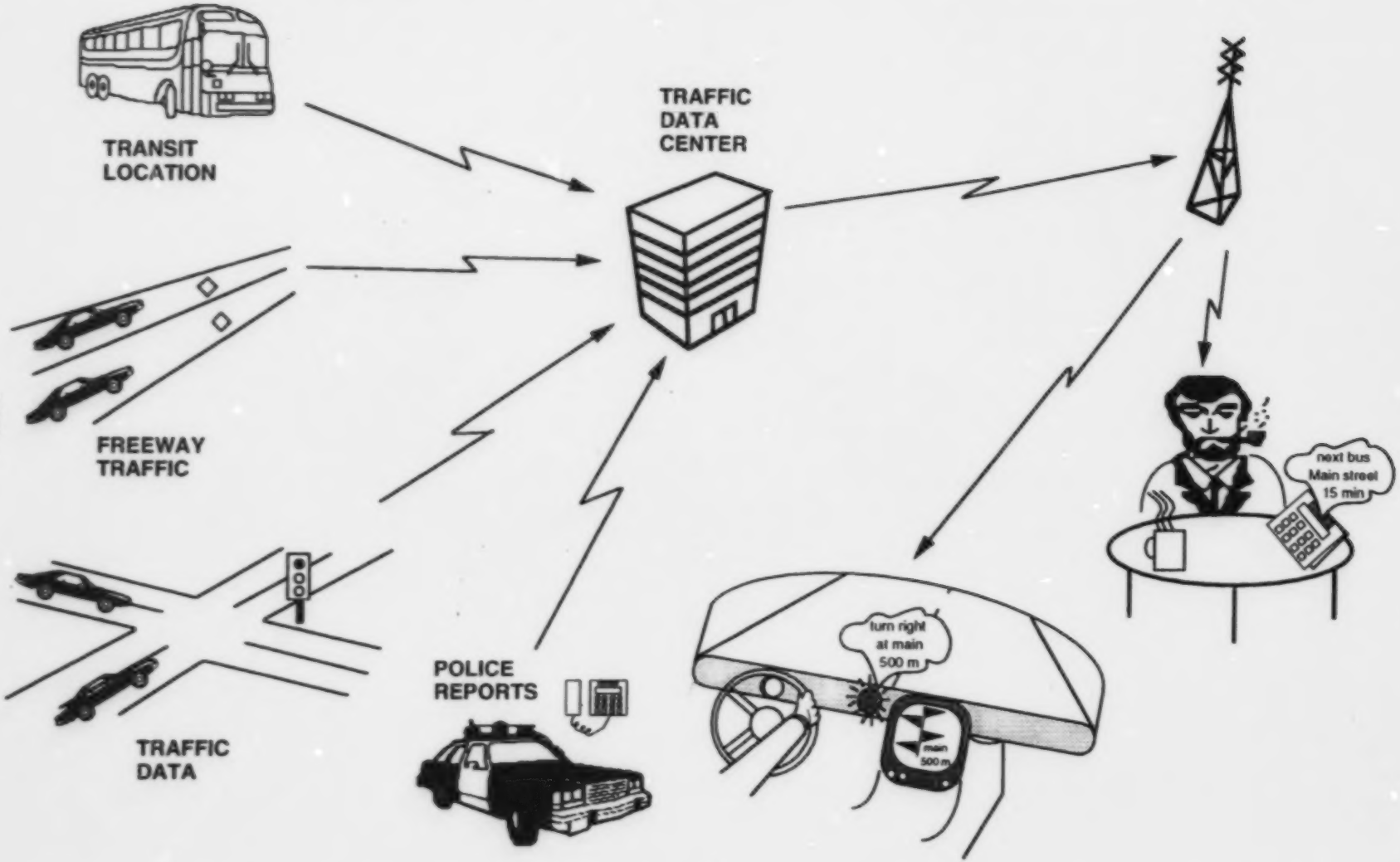
TYPICAL LOW-END SYSTEM

- Hand-held pager-type data receiver
- Simple LCD display
- Congestion information provided on limited routes
- Cost: $100-$300

ONTARIO'S TRAVELGUIDE CONCEPT

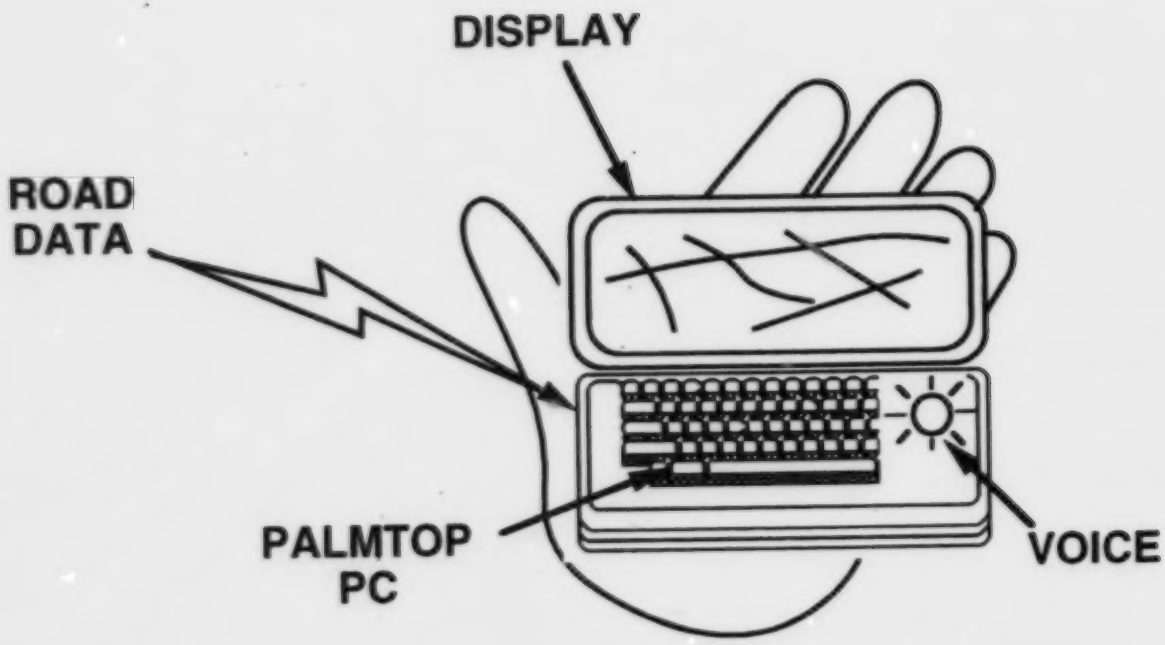
- Portable computer-based device
- No location capability
- Route guidance provided
- Traffic and transit info provided
- Voice based instructions to driver
- LCD map displays
- TravelGuide to work anywhere in North America
- Cost: $500

TRAVELGUIDE CONCEPT

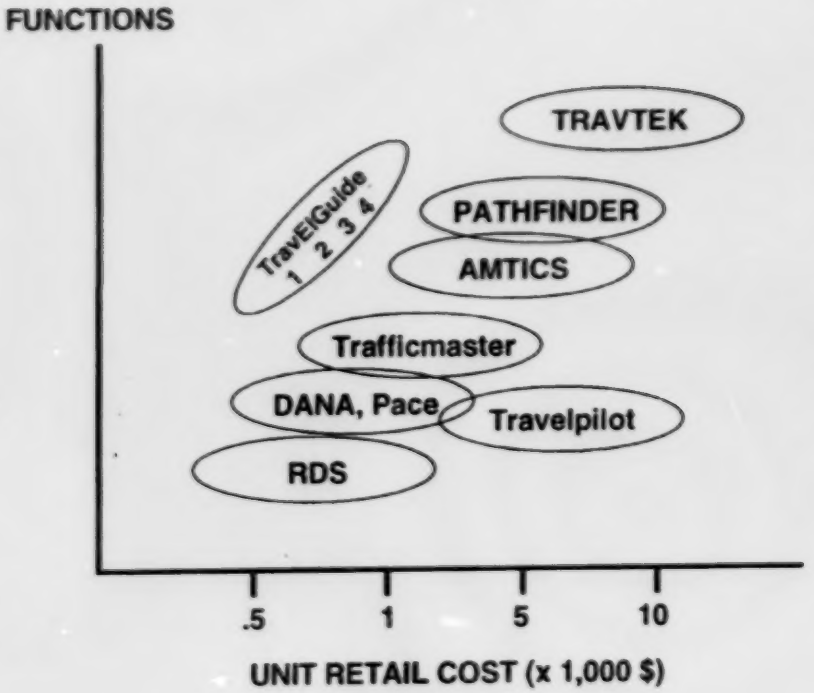


© H 92-44-010/Concept

TRAVELGUIDE UNIT



COST/BENEFIT OF EXISTING ATI SYSTEMS



TRAVELGUIDE PLANS - TWO PHASES

Phase I - Development and limited Toronto demonstration

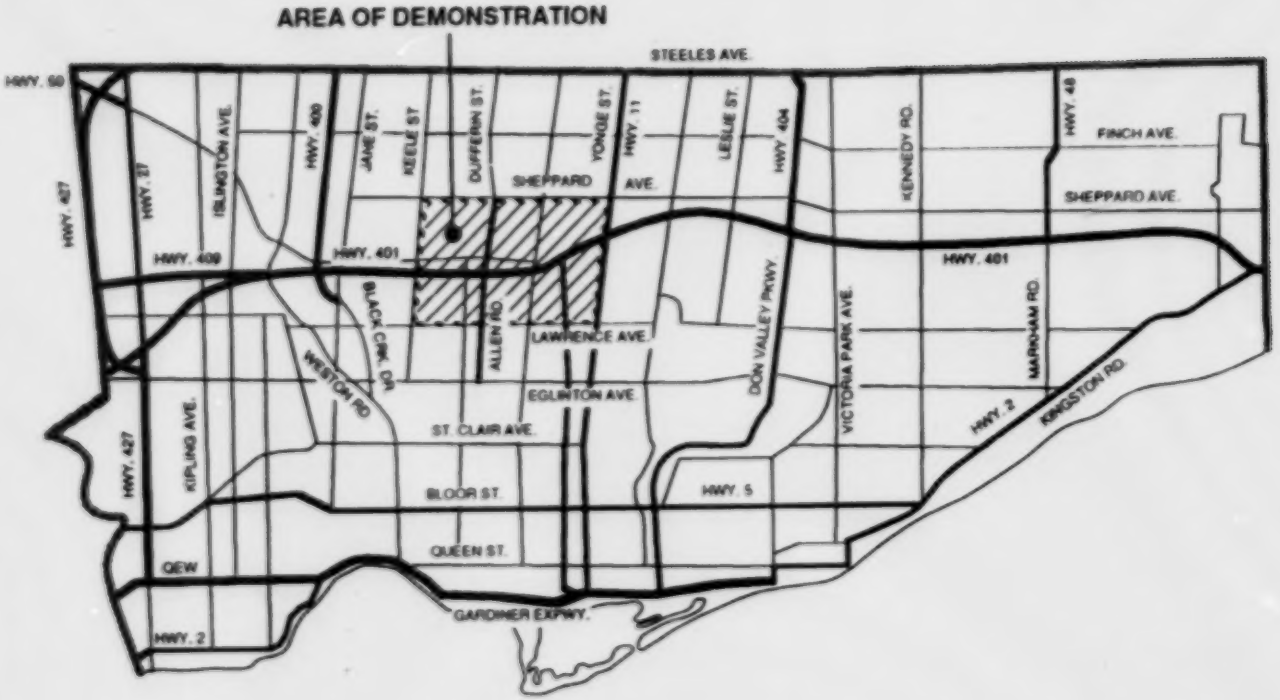
Phase II - Commercialization

TRAVELGUIDE PLANS (cont)

PHASE I - DEVELOPMENT AND DEMONSTRATION

- Ministry to develop data collection and processing system:
  - MTIPS - Metropolitan Toronto Transportation Information Production System
  - TTC data for arterial travel times
  - FTMS data for freeway travel times
  - Incident information from police, etc.
  - Above combined to yield link travel times
  - Success not guaranteed, testing under way
  - Ministry to provide data for demonstration

METROPOLITAN TORONTO



Hel/02-44-003/Demo

TRAVELGUIDE PLANS - Phase I (cont)

- Private sector in cooperation with Ministry to develop:
  - Communications
  - Portable equipment
  - Map data base
  - Routing and other software
- Other jurisdictions interested in participation

TRAVELGUIDE PLANS - Phase I (cont)

- Issue Request for Partnership Proposal (RFPP)
- Private/Public partnerships envisioned
- Ministry to develop data collection, processing system
- Private sector to develop/assist with development of:
  - communications
  - hand-held unit
  - map data base
  - portable unit hardware
  - system integration
- Finish with evaluation and assessment

TRAVELGUIDE PLANS (cont)

PHASE II - COMMERCIALIZATION

- Predicated upon successful demonstration
- Ministry to collect and provide Metro data
- Private sector to sell service and equipment to public
- Service providers to pay for data
- Other cities may participate
- Geographic coverage may be enlarged
- Extend system to other cities

NEXT STEPS

- Ministry planning to issue RFPP in September
- Responses due in October
- Demonstration completed in Summer 1993

INTERNATIONAL
IVHS
STANDARDS DEVELOPMENT

by

J. WANG

Ontario Ministry of Transportation

Transportation Technology and Energy Branch

AUGUST 25, 1992

J.W. 92/93-019

"The world is run by those who show up"

Richard Weiland
Chairman
Standards and Protocol
IVHS America

Benefits of Attending IVHS Standards Committees

- Monitor current activities (of competitors)
- Preview upcoming technologies and potential impact on standards
- Lobby for adaptation of specific technical standards

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Business Cycle for New Technologies

PHASE I	PHASE II	PHASE III
Product Development	Competition for Standard eg., VHS vs Beta	Competition for Profit

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Market Model – Canada, U.S.

Political Model – France, Italy

Mixed Model – Germany, Japan

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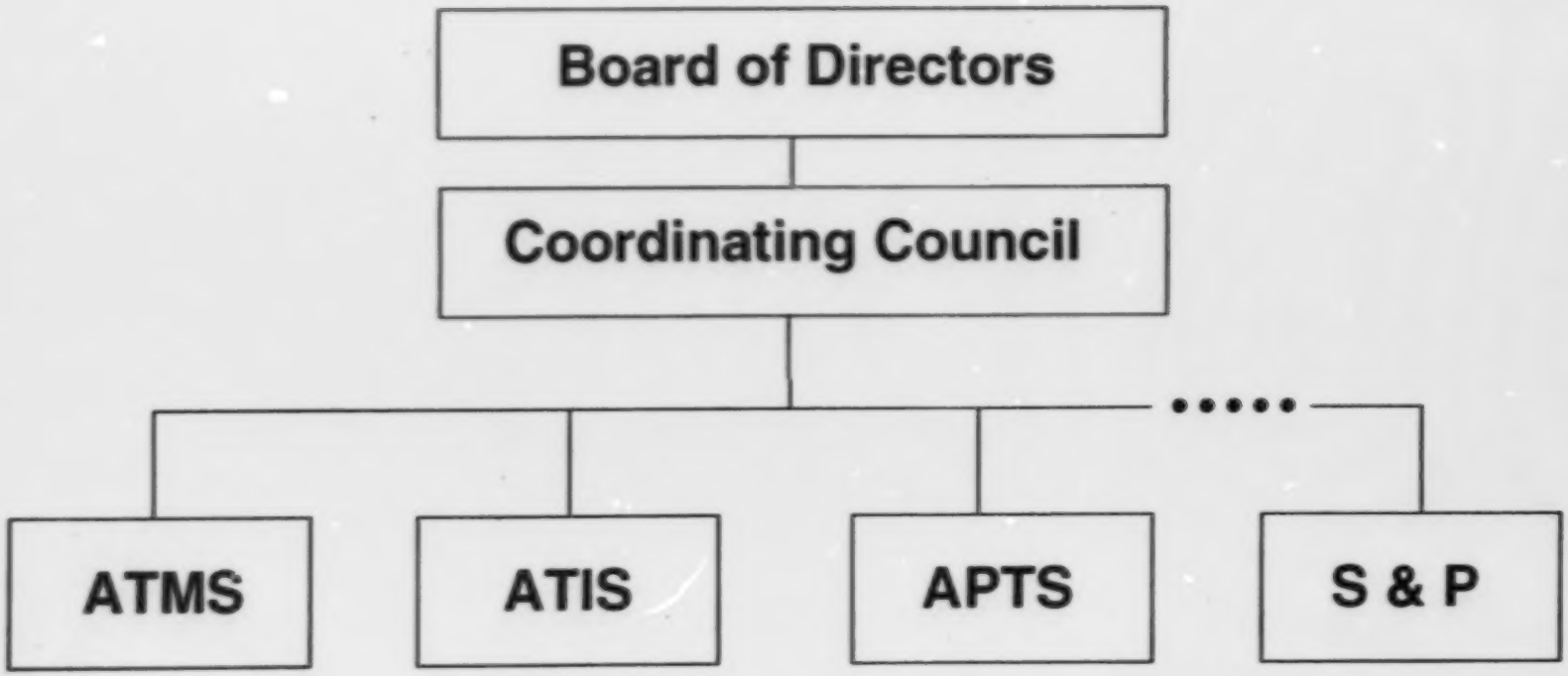
IVHS America



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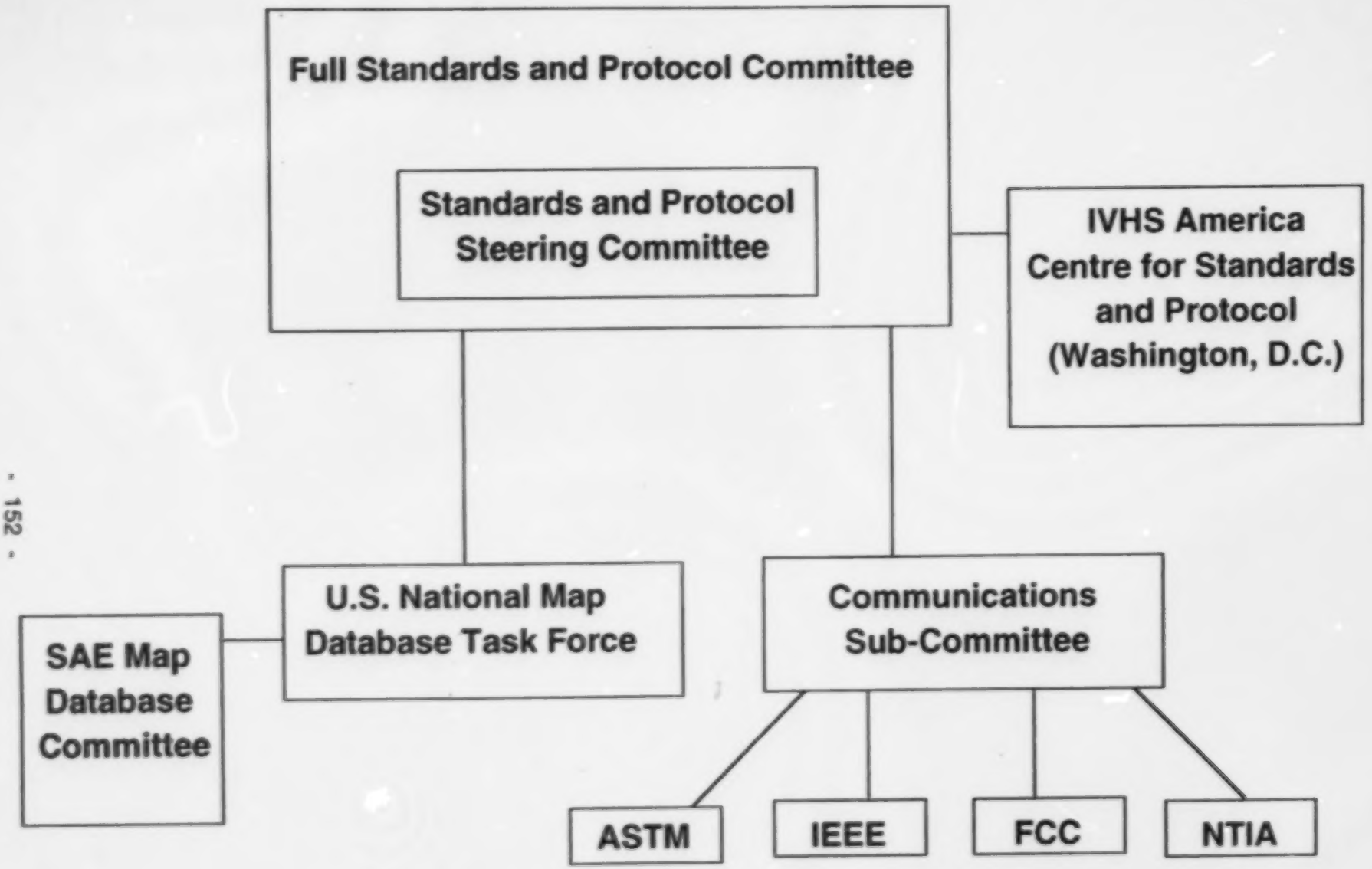
Full Standards and Protocol Committee
Standards and Protocol Steering Committee
IVHS America Centre for Standards and Protocol (Washington, D.C.)
U.S. National Map Database Task Force
SAE Map Database Committee
Communications Sub-Committee
ASTM
IEEE
FCC
NTIA

J.W. 12/93-019

ERTICO European Road Transport Telematics Implementation Coordination Organizations

CEN/TC 278 Working Groups:

1. Automatic fee collection and access control (NL)
2. Freight and fleet management systems (S)
3. Public transport (F)
4. Individual traffic information (GB)
5. Traffic control (GB)
5. Parking management (F)
7. Geographic and road databases (D)
8. Traffic databases (F)
9. Dedicated short-range communication (D)
10. Man-machine interfaces (F?)
11. Transport subsystem interfaces (N)
12. Automatic vehicle identification (N)

DIN, etc.

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THE STATUS OF JAPANESE IVHS STANDARDS

ATMS

- Urbanway
- Expressway

National Police Agency
Japan Highway Public Corporation (JHPC)
Metropolitan Expressway Public Corporation
Manshin Expressway Public Corporation

ATIS

- Digital Road Map

Digital Road Map Association (DRMA)

VICS Promotion Council

- System
- Database
- Safety
- Media

J.W. 92/93-019

Standardization Working Group

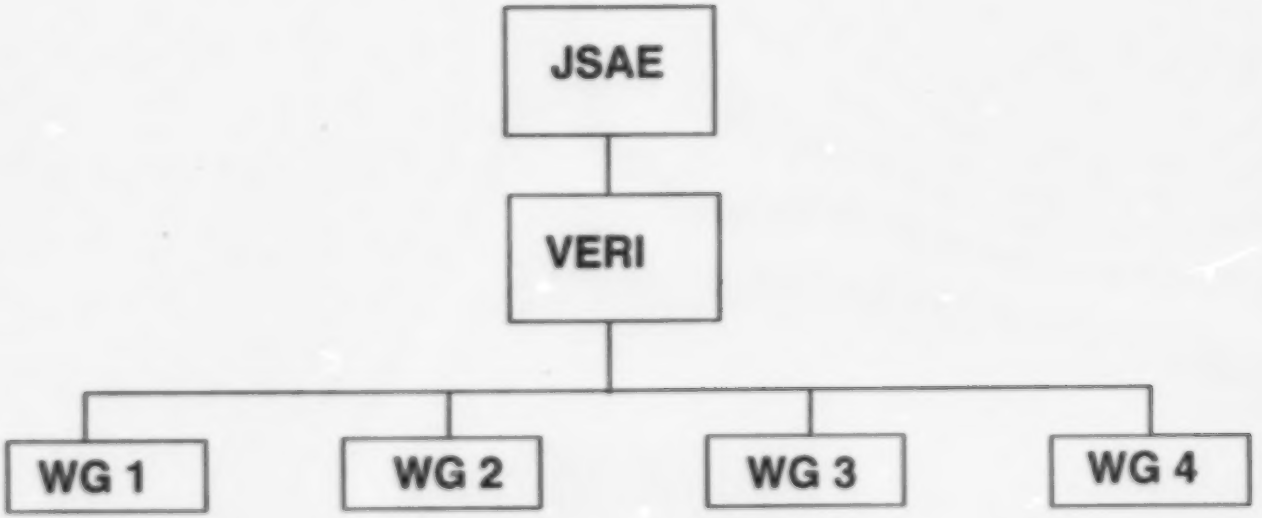
1. Standardization of Digital Road Map
   By: Digital Road Map Association (DRMA).
   Started 1988.

2. Standardization of Infrastructure
   By: Vehicle Information & Communication System Promotion Council (VICS).
   Started October 1991.

3. Standardization of Human Interface & In-vehicle System
   By: Vehicle/Road Intelligence Committee (VERI).
   Started October 1991.

4. Others

Organization of Vehicle/Road Intelligence Committee



JSAE: Society of Automotive Engineers of Japan
VERI: Vehicle/Road Intelligence Committee
WG 1: System Assessment Working Group
WG 2: Information/Driver Behaviour Analysis Working Group
WG 3: Standardization Working Group
WG 4: Joint Workshop Working Group

J.W. 92/93-019

Working Groups

WG 1: System Assessment Working Group
Tsuneo Takahashi, Honda Motors

WG 2: Information/Driver Behaviour Analysis Working Group
Hiroshi Arai, Toyota Motors

WG 3: Standardization Working Group
Taka-aki Katoh, Nippondenso

WG 4: Joint Workshop Working Group
Yoshitaka Hata, Nissan Motors

VERI: Vehicle/Road Intelligence Committee
Hiroshi Arai, Toyota Motors

COMMERCIAL VEHICLE OPERATIONS (CVO)

Ministry Activities and Market Needs

by

Joe Tsai

Ontario Ministry of Transportation

Transportation Technology and Energy Branch

August, 1992

J.T./92-44-021/CVO

WHY IVHS IN CVO

- Efficiency and productivity for motor carriers
  - Time savings
  - Electronic, paperless processing
  - Vehicle tracking and two-way communications
- Efficiency and productivity for Transportation Agencies
- Technologies for more effective, efficient processing
  - Weigh-In-Motion (WIM)
  - Automatic Vehicle Identification (AVI)
  - On-Board Computer/Smart Card
  - Electronic Toll Collection (ETC)
  - Electronic Data Interchange (EDI)

CVO PROJECTS UNDER WAY AND PLANNED

1) HELP/CHELP Crescent Project

CVO PROJECTS UNDER WAY AND PLANNED

2) Advantage I-75

- One-stop Trucking, provided carriers/trucks
  - Registered
  - Good operating record
  - Weights ok
  - Time window
  - AVI equipped

AVI ONTARIO – AVION

System Concept

- Cooperation with Advantage I-75 and Border Crossing agencies on implementation
- Carrier pre-qualification
  - one-stop or no-stop trucking
- Paper work burden reduction
  - electronic paper checking
- Vehicle tracking and two-way communications
- Use of IVHS technologies: AVI, WIM
- Implementation on Highway 401

J.T./92-44-021/CVO

AVION

Status

- Participated in the ADVANTAGE I-75 for planning, design and implementation
- A US and Canadian consultant team hired by ADVANTAGE I-75 for implementation

Resources

- Ontario $1.5 M (ADVANTAGE I-75 $7 M)

Duration

- 2 - 3 years

AVION

Opportunities

- Hardware
- Software
- System Development
- System Integration
- Vehicle tracking and two-way communications service
- Highway travel time and congestion information service

ONTARIO/MICHIGAN BORDER CROSSINGS

- Bi-directional Traffic*

Canadian City/ U.S. City	Facility Name	1988 Total Traffic	1987 Truck Traffic	Roadway Lanes
Windsor/ Detroit	Ambassador Bridge	6,601,000	1,562,000	4
Windsor/ Detroit	Detroit-Windsor Tunnel	6,200,000	189,000	2
Sarnia/ Port Huron	Blue Water Bridge	4,580,000	546,000	3
	Total	17,381,000	2,297,000	

- Total annual excess delay costs*
  - U.S. $11.7 million

- Source: Final report - St. Clair and Detroit Rivers International Crossings Study

BORDER CROSSING IMPROVEMENTS

- Speed border crossing operations at Windsor/Detroit and Sarnia/Port Huron
  - cargos/trucks
  - truck drivers
  - electronic toll collection
  - link between 401 and I-75

- Participants
  - Ontario, Michigan
  - Transport Canada, FHWA
  - Customs, Immigration
  - Bridge, Tunnel operators
  - Trucking Associations
  - Customs Brokers

- Status
  - Agreement in principle to proceed
  - Hiring consultants to look at institutional issues

IVHS APPLICATION OPPORTUNITIES AT THE BORDERS

- Automatic toll collection at bridges and tunnel
  - AVI Tag/Smartcards
- Automated customs clearance of commercial vehicles/cargos
  - AVI Tag/Smartcards
- Automated immigration clearance for pre-screened truck drivers
  - Smartcards
- Automated customs and immigration clearance for pre-screened commuters
  - Smartcards
- Other innovative and creative solutions related to the border crossing operations
  - Information sharing and system integration

IMPLEMENTATION STRATEGY

- Staging
  - Phase I: Institutional Impact Study (1992)
  - Phase II: Planning and Design (1992/93)
  - Phase III: Demonstration and Testing (1993/94)

- System Integration
  - Among agencies and operators
  - Link between Hwy 401 and I-75

- Commercial vehicles first, private vehicles next

CVO PROJECTS PROPOSED (U.S.)

	Title	Resources	Duration
1)	Electronic Safety Inspection Systems	$1 M	2 years
2)	Automatic Fuel Tax Record Keeping Systems	$0.75 M	2 years
3)	Electronic Commercial Vehicle Credential Systems	$1 M	3 years
4)	Real-Time Fleet Management Systems	$0.5 M	1.5 years
5)	International Border Crossing Operational Test	$2 M	3 years
6)	Synthesis of State Commercial Vehicle Institutional Studies	$0.1 M	1 year
7)	CVO IVHS Needs Survey, Design and Operational Criteria	$0.875 M	2 years
8)	Regional Permit Agreement Operational Tests	$2 M	3 years
9)	Evaluation of IVHS Corridor Projects and Test beds for Improving Hazard Info Systems	$0.75 M	3 years
10)	Motor Carrier Outreach Videos and Outreach Materials	$0.1 M	1 year
11)	Truck Specific Dynamic Warning Systems	$0.6 M	2 years
12)	Improved Weigh-In-Motion Systems	$0.5 M	2 years
13)	IVHS Systems for Intermodal Freight Transportation	$0.6 M	2 years

ADVANCED PUBLIC TRANSPORTATION SYSTEMS (APTS)

Overview and Opportunities

Barry R. Pekilis

P. Eng.

Ontario Ministry of Transportation

Transportation Technology and Energy Branch

August 25, 1992

What is APTS?

The APTS initiative provides for governments, universities, and industry to apply innovative technological solutions to enhance all modes of public transportation including transit and ridesharing.

Why APTS?

- Safety
- Reduce congestion
- Enhance mobility
- Minimize environmental impact
- Save energy
- Increase productivity

- More effective use and management of public dollars in response to reduced funding and scarcer resources.

How Will APTS Evolve?

- Standardization
- Public/private partnerships
- Cooperation at all levels of government
  - Federal, Provincial, and Municipal
- Research & Development
  - public, private, and joint ventures

Major Focus of APTS

1) Market Development
   - pre-trip planning, integrated fare media, mobility manager
2) Customer Interface
   - public information, in-vehicle systems, electronic fares
3) Vehicle Operations and Communications
   - AVL, data, software
4) High Occupancy Vehicle (HOV) Facilities Operation
   - regulation, automatic guidance

Major APTS Technologies

- Automatic vehicle location/control
- Communications (voice/data)
- Smartcards
- Palmtops, notebooks
- Audio/video
- Image processing
- Data processing/computers/networks

Major APTS Technologies (cont'd)

- Software
  - the "glue" that ties the hardware together
- Financial
  - cashless transactions, electronic funds transfer, security

Areas for Participation

- Systems integrators
  - prime contractors
  - assume responsibility and risks
- Suppliers and manufacturers
  - all types of technology and systems
    - standards - drive/driven by
- Software development
  - applications
  - interface
  - maintenance

Areas for Participation (cont'd)

- Consultants
  - ability to mix available technology and public transportation needs and requirements
- Financial institutions
  - clearing house for transit funds
  - accounting, audit, transfers, facilities, security
- Associations/Trade Groups
  - Canadian Urban Transit Association
  - American Public Transit Association

APTS-related Ontario Projects Under Way

1) AVL/C for small and medium Ontario transit properties
2) Automatic on-line scheduling for specialized transit
3) Area-wide Ridesharing service in the GTA
4) Robotic Bus Chassis cleaning using AVI
5) Automated maintenance feasibility study
6) OC Transpo AVLC, 560, on-street signage
7) TTC/Metro Toronto signal preemption
8) Ajax smartcard demonstration
9) GO Transit ticket vending machines

APTS – A Final Word

TECHNOLOGY ALONE IS NOT THE ANSWER

Innovation and technology must be combined with the practical management of capital and human resources if public transit is to meet the needs of society into the 21st century.